SCOTT|EDWARDS ARCHITECTURE LLP

Existing Facility Assessment:

Washington County Fair Complex

February 13, 2009

Updated - February 26, 2018

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1. Project Team

Project Team

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Albert Flannagan, Jr	Maintenance Manager

2. Executive Summary

Executive Summary

In 2009 the Washington County Fair Complex retained Scott | Edwards Architecture to evaluate the existing condition of the Fair Complex buildings in regard to general compliance with current codes. The Owner (Washington County Fair Complex) has requested an update of the 2009 Facilities Assessment Report to document: current condition, code compliance, potential upgrades with estimate of construction cost, estimate of replacement cost, and assessment of remaining useful life. This study reviews the current general compliance of the existing facilities with the 2014 Oregon Structural Specialty Code in relation to fire/life safety, accessibility, seismic, lateral and electrical systems.

Process / Criteria:

This study is based on general visual observations conducted during a site visit October 18, 2017 and conversations and descriptions from the Fair Complex personnel and available drawings (see appendix).
The size of each building listed is estimated based on aerial photos or available drawings, no field measurements were taken. Construction drawings were not available at the time of our visits and it is unlikely that original construction documents exist. Concealed problems with the construction of the buildings may exist that cannot be revealed through our review. All the buildings are assumed to be currently used for their originally constructed purpose. Occupancy Classification for the barns is based on the email from City of Hillsboro, dated March 2, 2009 (see appendix). The Occupancy Classification and Construction Type for all other buildings shown are based on descriptions from Fair personnel along with the visual inspection and will require further evaluation to be verified.

Additional Upgrades:

In addition to code compliance issues, this report contains a list of potential maintenance and facility upgrades to several of the buildings. This list is based on our observations and discussions with the Fair staff. These items are outlined in Section 5: Estimated Improvement Costs.

Applicable Codes:

2014 Oregon Structural Specialty Code
2014 Oregon Electrical Specialty Code

Facilities included in this study (See Key plan in Section 4 for locations):

Main Exhibit Hall
Cloverleaf Building
Poultry Barn
4-H Barn: North
4-H Barn: South
Dairy Barn West
Milking Parlor
Dairy Barn East
Restroom Building
Goat Barn
Sheep Barn
Show Ring
Auction Ring
Friendship Hall

Conclusion:

The purpose of this investigation was to determine the condition of each building in comparison to minimum fire / life safety, accessibility, structural / seismic and electrical performance levels as prescribed by the currently adopted codes. Observations, conclusions, and recommendations contained in this report reflect our best professional judgment based on limited visual observation.

Each of the buildings reviewed have numerous issues in regards to meeting current code. In some cases, it is our opinion they represent a severe hazard to occupants.

In regard to required upgrades and improvements to meet current code, if the building's use is not changing, improvements are not required to bring it into compliance with current code unless deemed unsafe by the local jurisdiction.

The findings are as follows (See Section 4: Building Evaluations for more detailed evaluations and recommendations on each building):

Main Exhibit Hall

Based on our visual investigation, we believe this building represents a severe life safety hazard to the public based on significant structural and seismic design deficiencies of the building structure. The deficiencies include inadequate roof diaphragm for transfer of seismic loads to the exterior walls, inadequate attachment of the walls to the roof and inadequate reinforcing in the CMU walls. Interior structural columns have been removed without properly modifying the roof structure to accommodate the longer spans. The roof framing is inadequate for design level snow and wind events and the wood roof structure elements are significantly overstressed and do not have the FS [factor of safety] required to maintain the minimum safety standard for the building. This represents a severe hazard to occupants. We recommend no occupancy until the required structural upgrades are complete. Vertical and lateral structural upgrades to the building, complying with current code requirements, should be implemented prior to its use.

Estimated Useful Life: The Main Exhibit Hall represents a severe hazard and is not recommended to be occupied without necessary upgrades. With the necessary improvements made, we would anticipate that the building would be usable for another 20 years. However, it is our understanding that the building will be demolished when the new exposition building is completed in 2020.

Cloverleaf Building

This building is in relatively good shape with the exception of the interior unreinforced masonry portion of the building which represents a severe life safety hazard to the public based on seismic design deficiencies. Lateral structural and seismic upgrades to this building, complying with current code requirements, should be implemented prior to its occupancy.

Estimated Useful Life: With the necessary repairs and proper maintenance and upkeep, we anticipate the building should be usable for another 20 years.

Executive Summary (con't)

Poultry Barns & 4-H Barns	These buildings are in general non-compliance with current code requirements and vertical and lateral structural and seismic upgrades to the buildings, complying with current code requirements, should be implemented prior to their use. Estimated Useful Life: These buildings are in fair condition with an estimated useful life of 7 years. With the necessary improvements and repairs, we would anticipate the useful life would be extended for another 30 years.
Show Ring & Auction Ring	Based on our visual investigation, we believe these buildings to be in good condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification. If the classification changes, structural upgrades would be required to meet current seismic design requirements. Estimated Useful Life: These buildings are in fair condition with an estimated useful life of 10 – 15 years.
Goat Barn	Based on our visual investigation, we believe this building to be in fair condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification. If the classification changes, structural upgrades would be required to meet current seismic design requirements. Estimated Useful Life: This building is in fair condition with an estimated useful life of 7 years. With the necessary improvements and repairs, we would anticipate the useful life would be extended for another 30 years.
Sheep Barn	Based on our visual observations, this building is in very poor condition and represents a severe hazard to occupants due to significant structural and seismic design deficiencies. This building should not be used until all necessary repairs are complete. The repairs will be extensive and will require a significant financial investment. It is our opinion that it is not worth the investment and the building should be removed and replaced. Estimated Useful Life: This building has reached it's useful life and we recommend removal and replacement. An alternative to consider in lieu of replacement would be to build a new concrete slab the same size as the building and rent a tent for use during the Fair. This would likely be a more cost effective option over the next 20 years.

Executive Summary (con't)

Dairy Barns West & East and Milking Parlor	Based on our visual investigation, we believe the Milking Parlor represents a severe life safety hazard due to significant structural and seismic design deficiencies and should be repaired prior to occupancy. Based on our visual investigation, the Dairy Barns appear to be in fair condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification. If the classification changes, structural upgrades would be required to meet current seismic design requirements. Estimated Useful Life: These buildings are in fair condition with the exception of the Milking Parlor. We would estimate a useful life of 7 years. With the necessary improvements and repairs, we would anticipate the useful life would be extended for another 30 years.
Restrooms	Based on our visual investigation, we believe this building represents a severe life safty hazard to the public due to significant structural and seismic design deficiencies. Vertical and lateral structural upgrades to the building, complying with current code requirements, should be implemented prior to its use. Estimated Useful Life: This building is in poor to fair condition with an estimated useful life of 7 years.
Friendship Hall	This building's infrastructure is in relatively good shape. Recommend immediate structural / seismic upgrade at the roof. The exterior envelope (roof) needs replacement in the near future. Estimated Useful Life: This building is in good condition with an estimated useful life of 15 years.
Site Work	The condition of the existing driveways are in fair condition with some cracking and spalling. We recommend replacement in the next 5-10 years or add a top coat that will need to be maintained on a 5-7 year basis.

3. Site Visit

Site Visit Attendees

The site visit consisted of general visual observations, and discussions with Fair personnel conducted with attendees listed below. Construction drawings were not available at the time of our visits and it is unlikely that original construction documents exist, nor were field measurements taken. Concealed problems with the construction of the buildings may exist that were not revealed through this walk through.

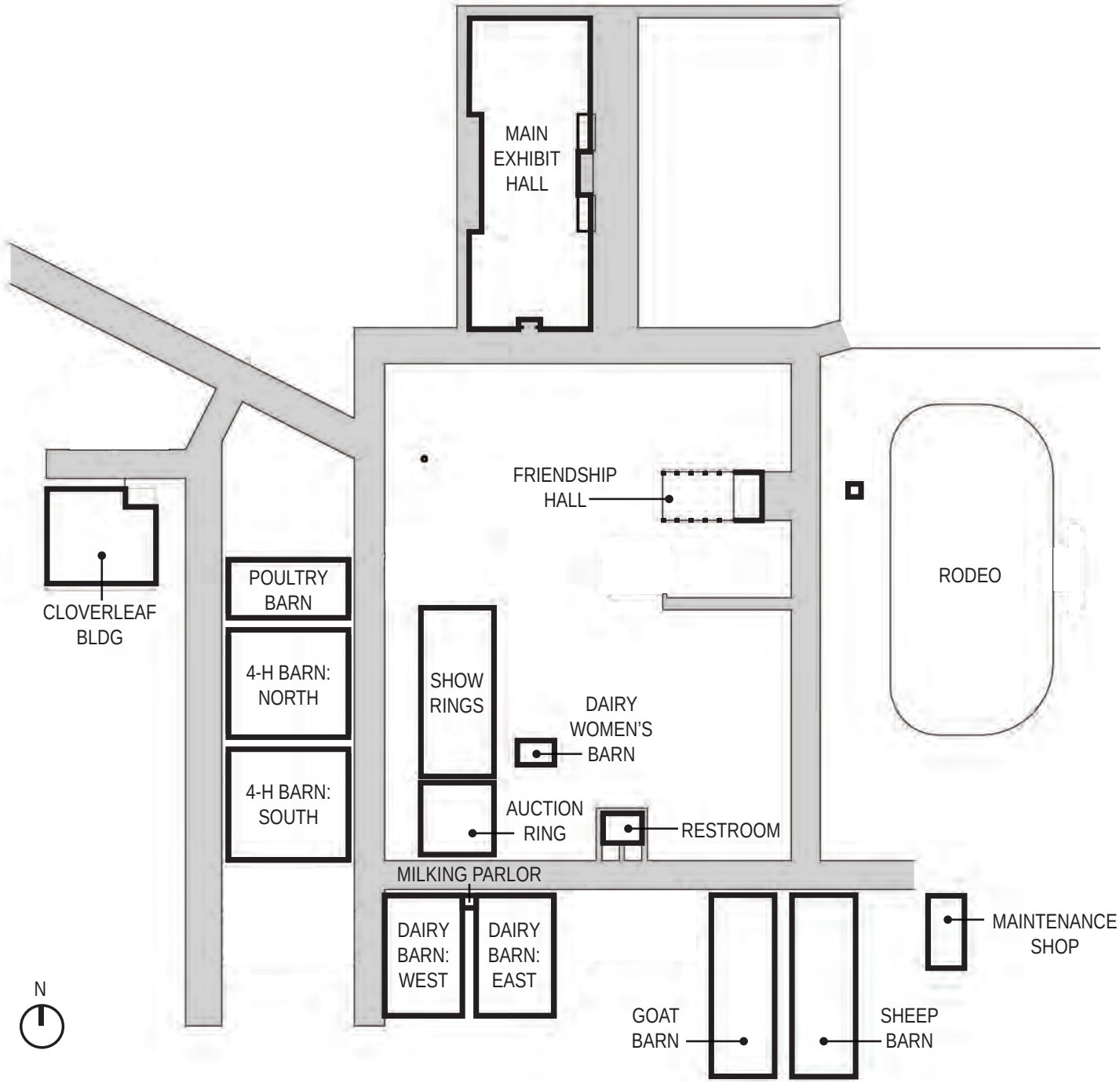
October 18th, 2017:

Sid Scott	Principal, SEA
Michael Anderson	Structural Engineer, SFA
Mark Jackson	Senior Electrical Engineer, Interface Engineering
Leah Perkins-Hagele	Fair Complex Manager
Albert Flannagan, Jr	Maintenance Manager

4. Building Evaluations

WASHINGTON COUNTY FAIR COMPLEX: KEY PLAN

NOT TO SCALE



SEA
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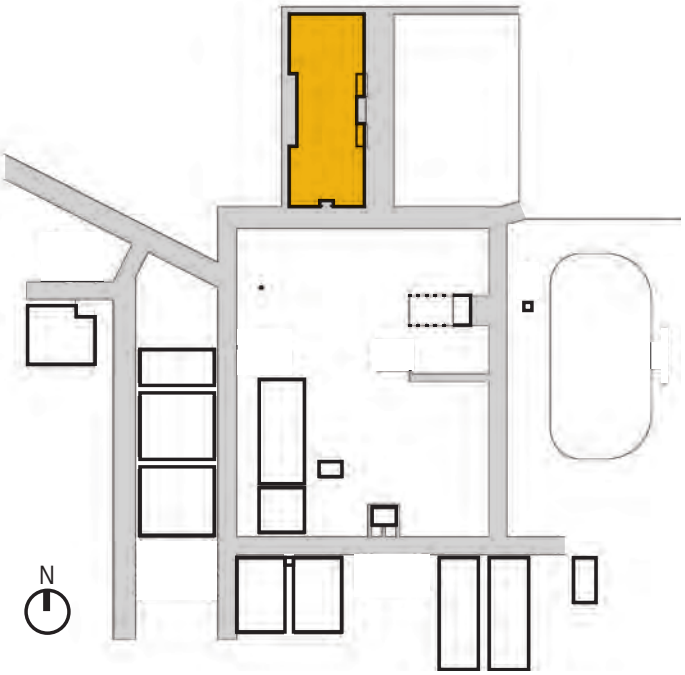
Main Exhibit Hall

Year of Construction (est):	1950's
Use:	Used year round as exhibit space
Occupancy (assumed):	A-3 (Assembly)
Type of Construction (assumed):	Type V-B (nonrated)
Occupant Load (posted):	1,525 people
north end:	1,000
south end:	525 people

KEY PLAN



Description: The structure is reported to have been built in 1950, generally rectangular in shape having an approximate 25,000 sf footprint, and one level in height. One major renovation of the structure occurred in 1990 wherein a number of columns supporting the heavy timber roof trusses were removed and the remaining trusses strengthened for the larger spans. The roof is skip sheathed with standing seam metal roofing. The building is fully sprinklered and the system is reported to be 11 years old. Currently, main hall is divided into 2 spaces; (1) 16,000 sf space and (1) 8,000 sf. This facility is slated to be replaced by a new exposition building in 2020. It is our understanding the owner plans to demolish this structure when the new exposition building is completed.

Based on the site visit October 18, 2017, the building appears to be in the same condition as it was in 2009 with minor to no improvements.

See Appendix for additional information.

Summary of the Issues

Architectural:
The upgrades required fall into four catagories; exiting, accessibility, plumbing fixtures and water infiltration.

- Exiting: The building is required to have 4 exits. Both portions of the exhibit hall are required to have 3 exits. It appears that the exisitng exit locations may not meet separation requirements. Further field verification required to confirm exit layout meets current code.

- ADA Accessibility: Access to the restrooms needs to be be reconfigured to meet code. Accessibility within restrooms will need to be assessed and updated.

- Plumbing fixtures: Alteration of existing Group A occupancies require adding plumbing fixtures to meet new code if the cost of the alterations to the facility exceeds 60% of appraised value. For a 24,000 sf facility, 6 water closets and 2 lavatories per sex, as well as 1 drinking fountain are required.

- Water Infiltration: Per reports dated July 17, 2008 and Nov 17, 2008, remove existing roof and replace with new standing seam metal roof and replace missing/damaged roof insulation. See Appendix G and H.

Main Exhibit Hall (con't)

Structural:
Based on our visual investigation, we believe this building represents a severe life safety hazard to the public. Vertical and lateral upgrades to the building, complying with current code requirements, should be implemented prior to its use.

- Gravity Systems: The gravity components of the structure, which include the 1x skip sheathing, 2x6 purlins, 2x8 ridge beam, heavy timber trusses, wood columns, steel retrofit trusses, steel columns, unreinforced CMU bearing walls, and foundations, in general appear visually to be in good condition, however, based on experience and currently accepted design standards, we feel that the entire roof system is poorly constructed, sorely undersized and, if subjected to design level loading, likely to collapse. The unreinforced CMU bearing walls are likely adequate for gravity loadings they would be required to resist under current requirements with the exception of the flush wall pilasters. Due to the lack of reinforcement it is possible that sudden failure would occur under maximum loading. Foundations appear to be adequate due to the absence of noticeable settlement.

- Lateral (Seismic) Systems: The lateral system of this structure is basically composed of a 1x skip sheathing diaphragm supported by unreinforced CMU shearwalls. Diaphragms of this type poorly transfer lateral loadings to their supporting members. Due to the large amount of solid wall around the perimeter of the building it is expected that the existing unreinforced CMU shearwalls would perform adequately during a design level seismic event for in-plane lateral loadings.

We have major concerns with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading and vertical loading from snow and wind events. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

- Factors of Safety (FS): It may be helpful to understand how building design actually works in order to understand what we mean when we say a building is unsafe. Structural design employs engineering principals to come up with various types of loadings that are applied to the building. The members or systems within the building are then evaluated for their corresponding stress levels. Allowable stress levels are affected by the grade of the material being used, the size and configuration of the section used, and the length of the member being used. Allowable stresses have factors of safety built into them by the various code committees that are in charge of the particular material type in order to avoid collapse due to the reliability of the grading of the material being used. For instance, wood design has a FS of 4 for most wood types. So when we say that a roof member doesn't work under a design level snow event but the roof doesn't collapse, the structure is using the reserve capacity of the member contained within the factor of safety for the design of that members material type. This concept applies to both vertical and lateral systems. That said, while the building appears to be holding up under the loadings experienced over the last several decades, it is using an unacceptable factor of safety for occupancy as determined and described by the currently adopted International Building Code. Some of the roof members have a FS less than 1 when it is required by code to have a minimum FS of 4. The result is the wood structure is significantly overstressed and does not have the FS required to maintain the minimum safety standard for the building. This represents a severe hazard to occupants.

- Mitigation of deficiencies for occupancy: We have identified five different areas of concern with respect to the performance of this building during design level loadings that would affect the occupancy of the building.

1. Inadequate roof diaphragm for transfer of design level seismic loads to resisting lateral lines.
    a. Opt 1: Remove existing roofing and install new roof sheathing on top of roof with proper sub-diaphragms, continuous cross ties, and nailing and re-roof.
    b. Opt 2: Leave existing roofing in place and provide new roof sheathing with proper sub-diaphragms, continuous cross ties, and nailing from the underside of the roof.

Main Exhibit Hall (con't)

2. Inadequate roof framing for design level snow and/or wind loads.
    a. Provide additional framing sistered to existing roof framing for additional strength to resist wind and/or snow loadings.
3. Inadequate attachment of CMU walls to the roof diaphragm.
    a. Install appropriately designed simpson wall ties, generally spaced at approximately 4ft on center with attachment to top of CMU wall and roof diaphragm.
4. Inadequate reinforcement of CMU walls for out of plane seismic loading.
    a. Opt 1: Provide carbon armor fabric on both sides of the CMU walls spaced at approximately 30" oc with appropriate development length and attachment to roof diaphragm.
    b. Opt 2: Provide steel HSS strong backs at 30" oc that span from anchorage to the slab on grade and the roof structure above. Provide clip angles at 18" oc for full height with 5/8" diameter epoxy anchors with simpson SET-XP epoxy and 5" min embed typ.
5. Improper construction for removal of existing columns at select locations.
    a. Replace all columns removed under previous remodel.
6. A portion of the roof wood structural members do not meet the code required factor of safety.
    a. Opt 1: Verify capacity and provide additional framing sistered to existing non-conforming roof framing to increase factor of safety above the code required minimum factor of safety
    b. Opt 2: Verify capacity and replace non-conforming wood structural members with new members that are adequately sized to meet the minimum factor of safety

Electrical:
The upgrades required fall into four catagories; emergency exit lighting, electrical service, electrical panel clearances, and energy efficient lighting.

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006.
- Revise existing exterior-mounted electrical service panel to comply with Oregon Electrical Specialty Code (OESC) article 230. This requirement limits the number of electrical services at a building where voltages are identical and aggregate ampacity is less than 2,000 amps.

- Revise existing interior conditions of the electrical room which prevent compliance with OESC article 110 as related to clearance requirements in front of electrical panels and equipment.

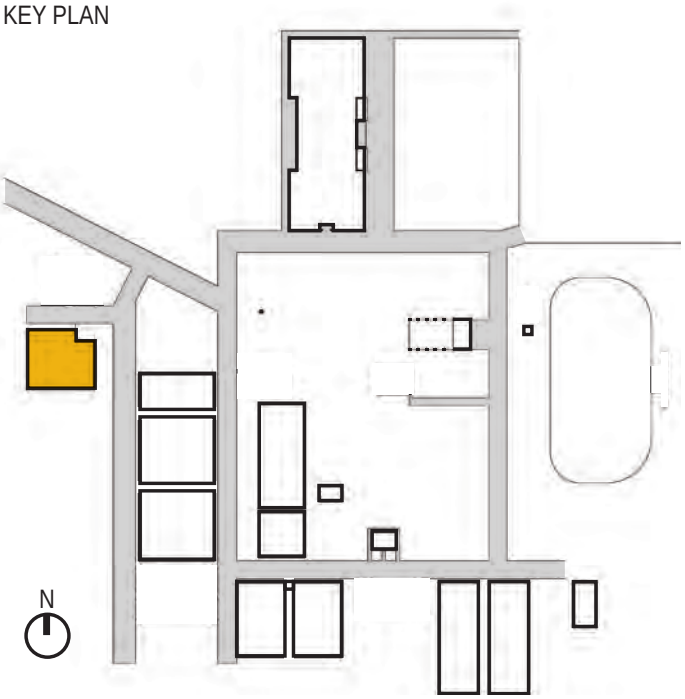
- The EPAC Act of 2005 prohibits the manufacture of all old technology relating to T-12 fluorescents, and manufacture of T12 magnetic ballasts was discontinued in 2010. Manufacture of T12 fluorescent lamps have been discontinued in 2012. Fulfillment of this requirement may necessitate replacement of all T12 fluorescent lighting with energy efficient LED.

Estimated Useful Life:
The Main Exhibit Hall represents a severe hazard and is not recommended to be occupied without necessary upgrades. With the necessary improvements made, we would anticipate that the building would be usable for another 20 years. However, it is our understanding that the building will be demolished when the new exposition building is completed in 2020.

Cloverleaf Community Building

Year of Construction (est):	1969, additon 1982
Use:	Used year round as meeting space
Occupancy (assumed):	A-3 (Assembly)
Type of Construction (assumed):	Type V-A (1 hour)
Occupant Load (posted):	235 people

KEY PLAN



Description: The 7,000 SF structure is comprised of a pre-manufactured steel building reported to have been erected in 1960, is generally rectangular in shape, and one level in height. The steel building was built over a one story unreinforced masonry building at the south portion. Currently, building is divided into large hall (3,500 sf), office, kitchen and two restrooms. Kitchen and the two restrooms are within the one story unreinforced masonry portion. Significant improvements were made to the interior and exterior of the building in 2010.

Based on the site visit October 18, 2017, the building appears to have been significantly renovated and the issues from the 2009 have been addressed with the exception of the ADA accessibility in the restrooms and the seismic work.

See Appendix for additional information.

Summary of the Issues

Architectural:
The upgrades required fall into one catagory: accessibility.

- ADA Accessibility: Accessibility within restrooms will need to be assessed and updated.

Structural:
Based on our visual investigation, we believe this building is in good shape however, the interior unreinforced masonry building represents a severe life safety hazard to the public. Lateral upgrades, complying with current code requirements, to this interior building should be implemented prior to its use.

- We have major concerns with respect to collapse of the unreinforced masonry portions of the building, and therefore life safety for the interior building, due to out of plane seismic loading. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of unreinforced masonry walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

- Since the 2009 assessment some renovations have been made in the kitchen area. Seismic vulnerabilities identified in the 2009 report have not been addressed.

Electrical:
The upgrades required fall into two catagories; emergency exit lighting and receptacle protection.
- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code section 1006.
- Revise existing interior power receptacles to comply

Cloverleaf Community Building (con't)

with Oregon Electrical Specialty Code article 210. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in non-dwelling unit kitchens and exterior locations.

Estimated Useful Life:
This building is in a relatively good condition with the exception of the seismic work needed to the un-reinforced portion. With proper maintenance and upkeep, we anticipate the building should be usable for another 20 years.

Poultry Barn, 4-H North, and 4-H South

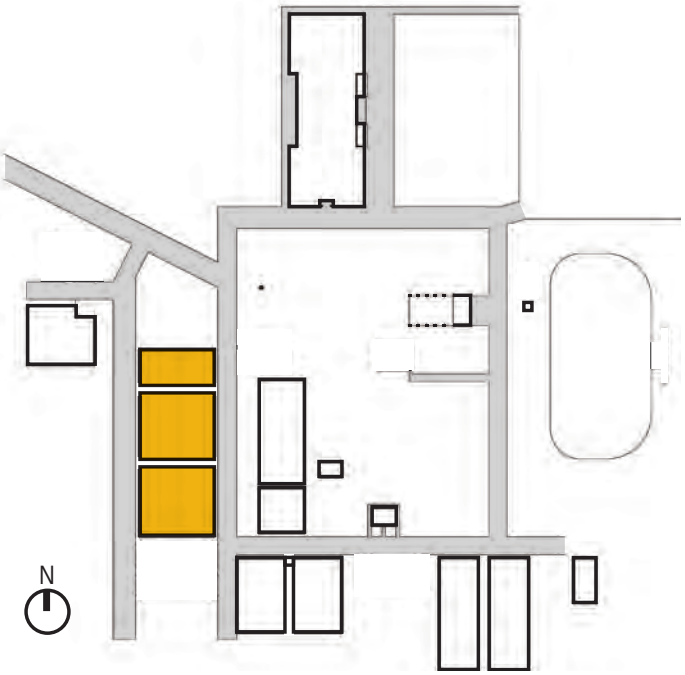
Year of Construction (est): various
Use: Limited, Show barns for Fair
Occupancy (assumed): S-1 (livestock shelters/ stables)
Type of Construction (assumed): Type V-B (unrated) for barns up to 9,000 sf.
Occupant Load: varies by barn

Description: Three buildings totalling approx. 27,000 SF (all estimated less than 9,000 sf). The buildings are traditional pole barn construction utilizing posts embedded in the ground that support roof trusses and 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing. The siding/roofing, where occurs, is corrugated metal.

Based on the site visit October 18, 2017, the buildings appear to have had minor improvements including painting and the sheds between the barns have been removed.

See Appendix for additional information.

KEY PLAN



Summary of the Issues

Architectural:
The upgrades required fall into two catagories; exiting and accessibility.

- Exiting: Provide man doors for exiting for the barns with walls. Minimum of 2 on opposite ends of the buildings.

- ADA Accessibility: Accessible path of travel through facility is needed.

Structural:
The condition of these buildings varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said, should these buildings be classified for use by the public, vertical and lateral upgrades to current standards would be required.

- Due to large spans, undersized members, poor construction practices, and long term exposure to water which has caused rot to occur in the skip sheathing, roof joists, and columns, we have concerns with the structural integrity of these buildings. In general, we would expect to find that the roof system is over stressed by at least a factor of 2.

- Problematic roof structures between 4H Barns North and South, and 4H Barn North and Poultry, have been removed since the 2009 assessment. Some roof members and poles exhibiting dry rot have been replaced, and some non-structural improvements have been made. Strengthening of lateral force system and gravity systems has not been implemented.

Poultry Barn, 4-H North, and 4-H South (con't)

Electrical:
The upgrades required fall into four catagories; fixture ratings, emergency exit lighting, receptacle protection, and grounding.

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
  - Areas having an equipotential plane
  - Outdoors
  - Damp or wet locations
  - Dirt confinement areas for livestock

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

Estimated Useful Life:
These buildings are in fair condition with an estimated useful life of 7 years. With the necessary improvements and repairs, we would anticipate the useful life would be extended for another 30 years.

Show Ring and Auction Ring

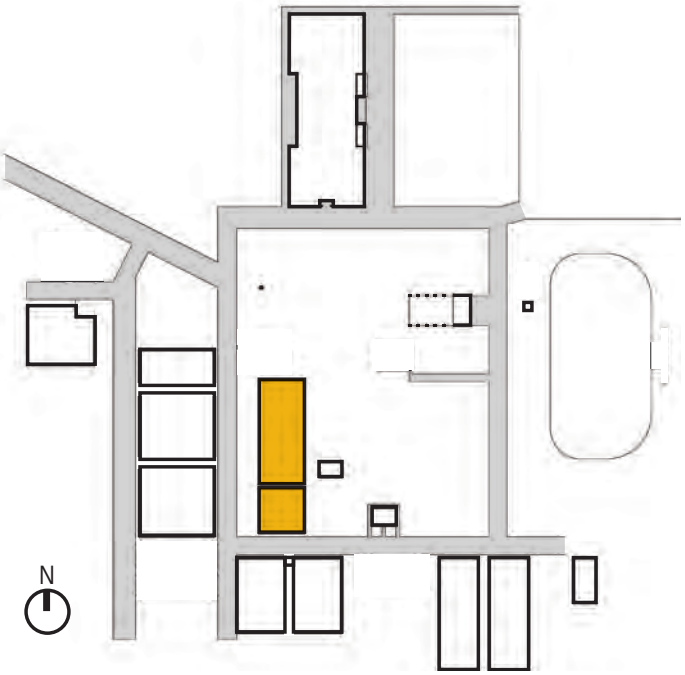
Year of Construction (est):	various
Use:	Limited, Show barns for Fair
Occupancy (assumed):	A-4 for show rings
Type of Construction (assumed):	Type V-B (unrated) for show rings up to 6,000 sf
Occupant Load:	varies by barn

Description: Two structures totaling approx. 12,000 SF (all estimated less than 6,000 sf). The construction of these buildings is consistent with traditional pole barn construction utilizing posts embedded in the ground that support roof trusses which in turn support 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing. The siding/roofing, where occurs, is corrugated metal.

Based on the site visit October 18, 2017, the buildings appear to have had minor improvements including painting.

See Appendix for additional information.

KEY PLAN



Summary of the Issues

Architectural:
The upgrades required fall into one catagory; accessibility

- ADA Accessibility: Accessible path of travel through facility.

Structural:
The condition of these buildings varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said, should these buildings be classified for use by the public, vertical and lateral upgrades to current standards would be required.

Estimated Useful Life:
These buildings are in fair condition with an estimated useful life of 10 – 15 years.

Goat Barn

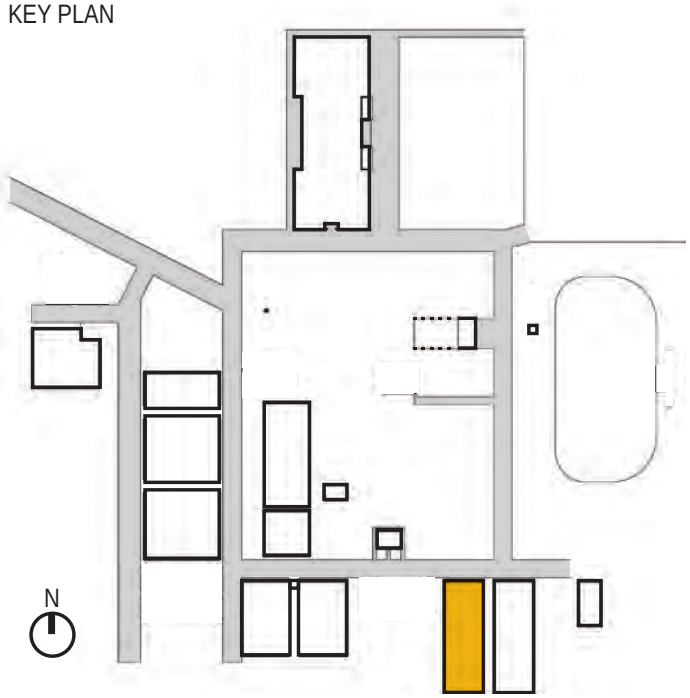
Year of Construction (est):	various
Use:	Limited, Show barns for Fair
Occupancy (assumed):	S-1 (livestock shelters/ stables)
Type of Construction (assumed):	Type V-B (unrated) for barns up to 9,000 sf.
Occupant Load:	varies by barn

Description: One building totaling approx. 5,500 SF. The construction of this building is consistent with traditional pole barn construction utilizing posts embedded in the ground that support roof trusses which in turn support 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing. The siding/roofing, where occurs, is corrugated metal.

Based on the site visit October 18, 2017, the buildings appear to have had minor improvements including painting.

See Appendix for additional information.

KEY PLAN



Summary of the Issues

Architectural:
The upgrades required fall into three catagories; exiting, accessibility and water infiltration.

- Exiting: Provide man doors for exiting for barns with walls. Minimum of 2 on opposite ends of the building.

- ADA Accessibility: Accessible path of travel through facility.

- Water infiltration: The site floods with heavy rains. It is recommended to build up the floor of the building with gravel or asphalt to keep water away from the structural posts and the interior of the building. The roof appears to have multiple leaks and should be repaired or replaced. We also recommend investigation of the condition of the structural poles below grade to verify condition in consideration of the site flooding that may have compromised some of the poles.

Structural:
Based on our visual investigation, we believe this building to be in good condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification.

- The condition of this building varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said, should this building be classified for use by the public vertical and lateral upgrades to current standards would be required.

- During our investigation it was also noted that leaks in the roof at multiple locations, and apparently over a consistent period of time, have likely caused rot to occur in the structure.

Goat Barn (con't)

Electrical:
The upgrades required fall into five catagories; fixture ratings, emergency exit lighting, receptacle protection, grounding and electrical service.

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…" Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
  - o Areas having an equipotential plane
  - o Outdoors
  - o Damp or wet locations
  - o Dirt confinement areas for livestock

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

- Revise existing service-entrance equipment and locations to comply with Oregon Electrical Specialty Code (OESC) articles 230 and 547. A site-isolating device (main disconnecting means/switch) is required where multiple buildings are fed from one distribution point. The site-isolating device is required to be pole-mounted (outside).

Estimated Useful Life:
This building is in fair condition with an estimated useful life of 7 years. With the recommended improvements, we would anticipate the building to be usable for another 30 years.

Sheep Barn

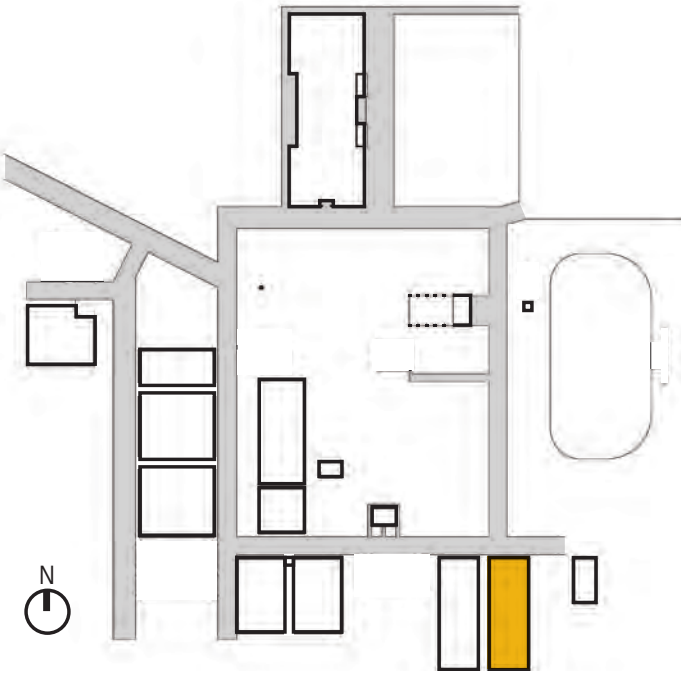
Year of Construction (est):	various
Use:	Limited, Show barns for Fair
Occupancy (assumed):	S-1 (livestock shelters/ stables)
Type of Construction (assumed):	Type V-B (unrated) for barns up to 9,000 sf.
Occupant Load:	varies by barn

Description: One building totaling approx. 6,800 SF. The construction of this building is consistent with traditional pole barn construction utilizing posts embedded in the ground that support roof trusses which in turn support 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing. The siding/roofing, where occurs, is corrugated metal.

Based on the site visit October 18, 2017, the buildings appear to have had minor improvements including painting.

See Appendix for additional information.

KEY PLAN



Summary of the Issues

Architectural:
The upgrades required fall into three catagories; exit, accessibility and water infiltration.

- Exiting: Provide man doors for exiting for barns with walls. Minimum of 2 on opposite ends of the building.

- ADA Accessibility: Accessible path of travel through facility.

- Water infiltration: The roof leaks in multiple locations and has caused significant damage to the structure. The roof needs to be replaced and structural repairs made. In addition, the site floods with heavy rains. The flooding needs to be addressed by raising the grade of the building to protect the floor area and the structural posts. This could be accomplished by adding a gravel or asphalt base to keep water away from the building. We also recommend investigation of the condition of the structural poles below grade to verify their condition in consideration of the site flooding that may have compromised some or all of the poles.

Based on the condition of the building and the on-going water issues, it is our recommendation to remove and replace this building.

Structural:
Based on our visual investigation, we believe this building to be in poor condition and in general non-compliance with current code requirements for a public use classification.

- During our investigation it was also noted that leaks in the roof at multiple locations, and apparently over a consistent period of time, have likely caused rot to occur in the structure.

Sheep Barn (con't)

Electrical:
The upgrades required fall into five catagories; fixture ratings, emergency exit lighting, receptacle protection, grounding and electrical service.

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…" Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
  - o Areas having an equipotential plane
  - o Outdoors
  - o Damp or wet locations
  - o Dirt confinement areas for livestock

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

- Revise existing service-entrance equipment and locations to comply with Oregon Electrical Specialty Code (OESC) articles 230 and 547. A site-isolating device (main disconnecting means/switch) is required where multiple buildings are fed from one distribution point. The site-isolating device is required to be pole-mounted (outside).

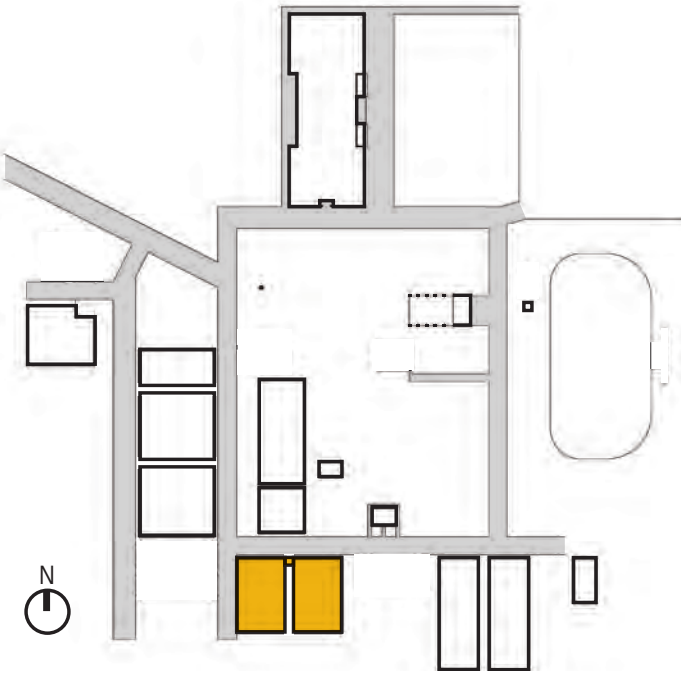
Estimated Useful Life:
This building has reached it's useful life and we recommend removal and replacement.

An alternative option to replacing the building would be build a concrete slab the same size as the current building and then rent a tent for use during the fair. This would likely be a more cost effective option over the next 20 years.

Dairy Barn West, Dairy Barn East, and Milking Parlor

Year of Construction (est):	various
Use:	Limited, Show barns for Fair
Occupancy (assumed):	S-1 (livestock shelters/ stables)
Type of Construction (assumed):	Type V-B (unrated) for barns up to 9,000 sf.
Occupant Load (estimated):	approx. 20 per barn (agricultural bldg)

KEY PLAN



Description: Two buildings plus covered milking parlor totalling approx. 14,000 SF. The buildings are traditional pole barn construction utilizing posts embedded in the ground that support roof trusses and 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing. The siding/roofing is corrugated metal.

The milking parlor is an un-dated, single level unreinforced masonry structure, rectangular in shape, one level in height, with a double pitched roof and slab on grade floor. Attached to, and extending away from, this building is a double pitched light framed breezeway. Roof construction consists of 2x joists with 2x collar ties spanning to post and beam lines.

Based on the site visit October 18, 2017, the buildings appear to have had minor improvements including painting.

See Appendix for additional information.

Summary of the Issues

Architectural:
The upgrades required fall into three catagories; exit, accessibility and water infiltration.

- Exiting: Provide man doors for exiting for barns with walls. Minimum of 2 on opposite sides of the building.

- ADA Accessibility: Accessible path of travel through facility.

- Water infiltration: The roof added between barns for the milking parlor have interrupted the roof drainage. This coupled with age of roof has caused water infiltration and damage to the roof framing members. The added roofs need to be removed and structural member assesed for rot or deterioration. Replace leaking roofing, gutters and downspouts.

Structural:
Based on our visual investigation, we believe the miking parlor and adjacent breezeway represent a severe life safety hazard. This building should be torn down or vertical and lateral upgrades, complying with current code requirements, building should be implemented prior to its use.

- We have major concerns for the unreinforced masonry component with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of

Dairy Barn West, Dairy Barn East, and Milking Parlor (con't)

Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

- The breezeway structure is in a state of failure and should be cordoned off and torn down.

Electrical:
Same as other barns, see "Poultry Barn, 4-H North and 4-H South" page for work.

Estimated Useful Life:
These buildings are in fair condition with the exception of the Milking Parlor. We would estimate a useful life of 7 years. With the necessary improvements and repairs, we would anticipate the useful life would be extended for another 30 years.

Restroom Building

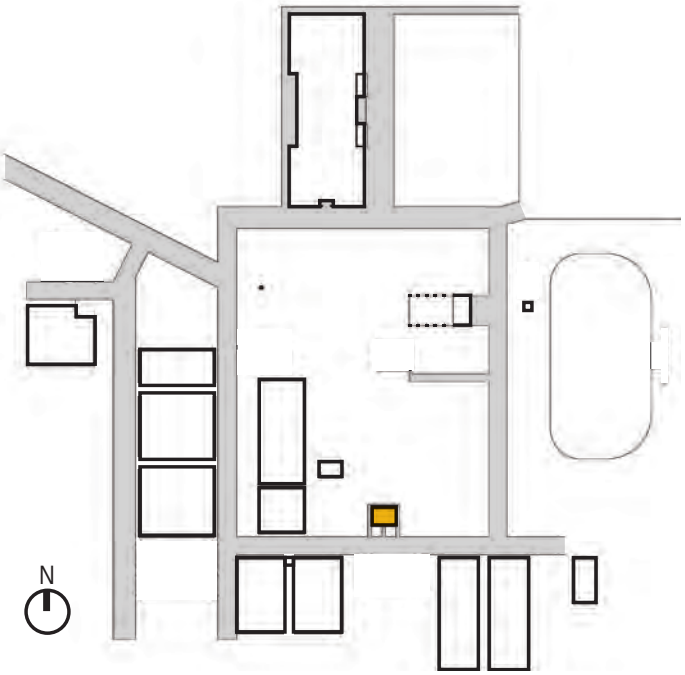
Year of Construction (est):	Unknown
Use:	Restooms and shower
Occupancy (assumed):	U (accessory structure)
Type of Construction (assumed):	Type V-B (unrated)
Occupant Load (estimated):	16 (locker room)

Description: This 800 SF building is an un-dated, single level unreinforced masonry structure, rectangular in shape, one level in height, with a double pitched roof and slab on grade floor.

Based on the site visit October 18, 2017, the building appears to have had minor improvements including painting.

See Appendix for additional information.

KEY PLAN



Summary of the Issues

Architectural:
The upgrades required fall into two catagories; accesibility and water infiltration.

- ADA Accessibility: Accessibility within restroom and showers to be addressed; including entrance access, stall size and shower controls.

- Water infiltration: Replace downspouts and gutters.

Structural:
Based on our visual investigation, we believe this building represents a severe life safety hazard to the public. Vertical and lateral upgrades, complying with current code requirements, to the building should be implemented prior to its use.

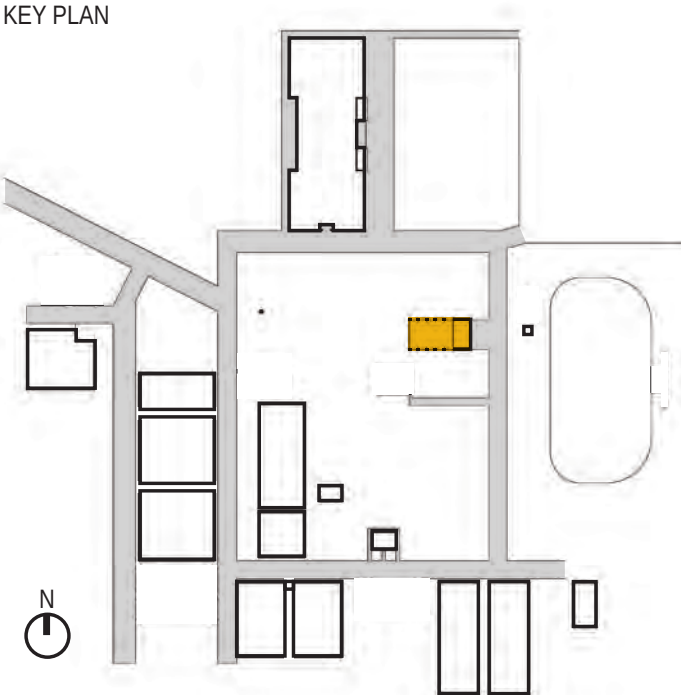
- We have major concerns with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

Estimated Useful Life:
This building is in poor to fair condition with an estimated useful life of 7 years.

Friendship Hall

Year of Construction (est):	Unknown
Use:	Gathering space used throughout the year
Occupancy (assumed):	A-3 (assembly)
Type of Construction (assumed):	Type V-B (unrated)
Occupant Load (estimated):	660 (assembly: standing space)

KEY PLAN



Description: 3,300 SF structure with raised stage. Construction - wood posts, open web wood trusses and galvanized standing seam metal roofing.

Based on the site visit October 18, 2017, the building appears to have had minor improvements including painting.

See Appendix for additional information.

Summary of the Issues

Architectural:
The upgrades required fall into two catagories; accessibility and water infiltration.

- ADA Accessibility upgrades to meet code requirements, including replacing handrails/guardrails and adding accessible access route to stage through a ramp.
- Water infiltration: Replace downspouts and gutters.

Structural:
Based on our visual investigation, we believe this building to be in good condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification.

- The condition of this building varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said,

should these buildings be classified for use by the public vertical and lateral upgrades to current standards would be required.

Structural (con't):

- During our investigation it was also noted that leaks in the roof at multiple locations, and apparently over a consistent period of time, have likely caused rot to occur in the structure.

Electrical:
The upgrades required fall into three catagories; fixture rating, emergency exit lighting and receptacle protection.

- Upgrade area lighting equipment (comprised primarily of 4-foot fluorescent luminaires) to provide compliance with Oregon Electrical Specialty Code (OESC) article 410. This section requires that all luminaires installed in damp location shall be marked "Suitable for Damp Locations."
- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006.
- Revise existing interior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 210. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in exterior locations.

Friendship Hall (con't)

Estimated Useful Life:
This building is in good condition with an estimated useful life of 15 years.

5. Estimated Improvement Costs

Estimated Improvement Costs

The following estimated project costs are based on current average first quarter 2018 project development costs, visual observations during the site visit and discussions with Fair personnel for amount of work to be completed. The estimated costs include hard construction costs, soft costs and contingency. The soft costs generally include permit fees, architectural and engineering fees, surveys, and geotechnical reports. Potential hazardous material assessment and removal is not included. Note that after the first quarter of 2018, the estimated costs need to be adjusted for modified market conditions.

The estimated project costs are provided for the following options in developing improvements to the current Fair Complex.

A. Estimated Repair Costs
These costs include making the recommended repairs in this report to each building.

B. Estimated Replacement Costs
These costs reflect the estimate to remove each structure and replace with a new building providing the same function as the original.

C. Estimated Demolition Costs
These costs are based on demolishing each building and leaving a bare dirt pad.

D. Estimated Temporary Structure Costs
These costs are based on demolishing each building and replacing with a concrete slab and new electrical service which will serve as infrastructure to support rented tent structures.

Washington County Fair Complex
Estimated Improvement Costs

			A. Estimated Repair Costs			B. Estimated Replacement Costs		
	Facility Name	**Square Feet (SF)**	**Cost per SF**		**Estimated Cost**	**Cost per SF**		**Estimated Cost**
1	Main Exhibit Hall	25,000	100	$	2,500,000	300	$	7,500,000
2	Cloverleaf Building	7,000	40	$	280,000	300	$	2,100,000
3	Poultry Barn	3,205	40	$	128,200	100	$	320,500
4	4-H Barn N.	6,700	40	$	268,000	100	$	670,000
5	4-H Barn S.	6,700	40	$	268,000	100	$	670,000
6	Dairy Barn:West	4,600	40	$	184,000	100	$	460,000
7	Milking Parlor	270	60	$	16,200	200	$	54,000
8	Dairy Barn:East	4,600	40	$	184,000	100	$	460,000
9	Restroom Building	800	100	$	80,000	350	$	280,000
10	Goat Barn	5,500	40	$	220,000	100	$	550,000
11	Sheep Barn	6,800	50	$	340,000	100	$	680,000
12	Show Ring	2,400	40	$	96,000	100	$	240,000
13	Auction Ring	6,100	40	$	244,000	100	$	610,000
14	Friendship Hall	3,700	30	$	111,000	100	$	370,000
	Site Work							
15	Remove and replace asphalt	110,000				6	$	660,000
16	Asphalt overlay over existing asphalt	110,000				4	$	440,000
17	Top coat asphalt	110,000				2	$	220,000

Washington County Fair Complex
Estimated Improvement Costs (con't)

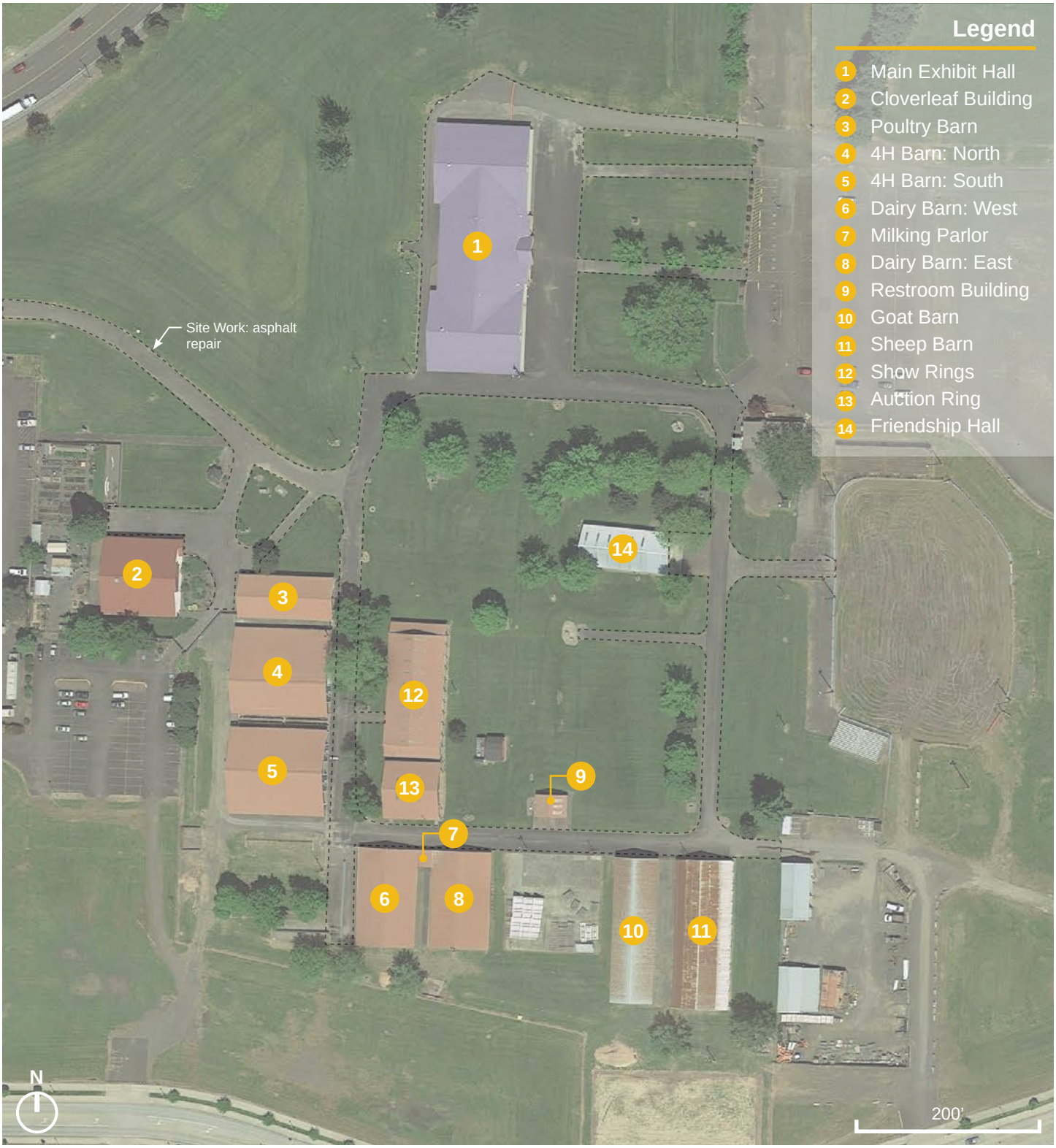
			C. Estimated Demolition Costs	
	Facility Name	Square Feet (SF)	Cost per SF	Estimated Cost
1	Main Exhibit Hall	25,000	15	$ 375,000
2	Cloverleaf Building	7,000	15	$ 105,000
3	Poultry Barn	3,205	15	$ 48,075
4	4-H Barn N.	6,700	15	$ 100,500
5	4-H Barn S.	6,700	15	$ 100,500
6	Dairy Barn:West	4,600	15	$ 69,000
7	Milking Parlor	270	15	$ 4,050
8	Dairy Barn:East	4,600	15	$ 69,000
9	Restroom Building	800	15	$ 12,000
10	Goat Barn	5,500	15	$ 82,500
11	Sheep Barn	6,800	15	$ 102,000
12	Show Ring	2,400	15	$ 36,000
13	Auction Ring	6,100	15	$ 91,500
14	Friendship Hall	3,700	15	$ 55,500

			D. Estimated Temporary Structure Costs		
	Facility Name	Square Feet (SF)	Estimated Cost		
			Concrete Slab & Electrical Service	Tent Rental	
1	Main Exhibit Hall	25,000	$ 500,000	$ 260,000	(12 months)
2	Poultry Barn	3,200	$ 64,000	$ 4,400	(1 month)
3	Dairy Barn:West	4,600	$ 92,000	$ 6,000	(1 month)
4	Dairy Barn:East	4,600	$ 92,000	$ 6,000	(1 month)
5	Goat Barn	5,500	$ 110,000	$ 8,500	(1 month)
6	Show Ring	2,400	$ 48,000	$ 3,200	(1 month)
7	Auction Ring	6,000	$ 120,000	$ 10,000	(1 month)
8	Friendship Hall	3,800	$ 76,000	$ 5,000	(1 month)

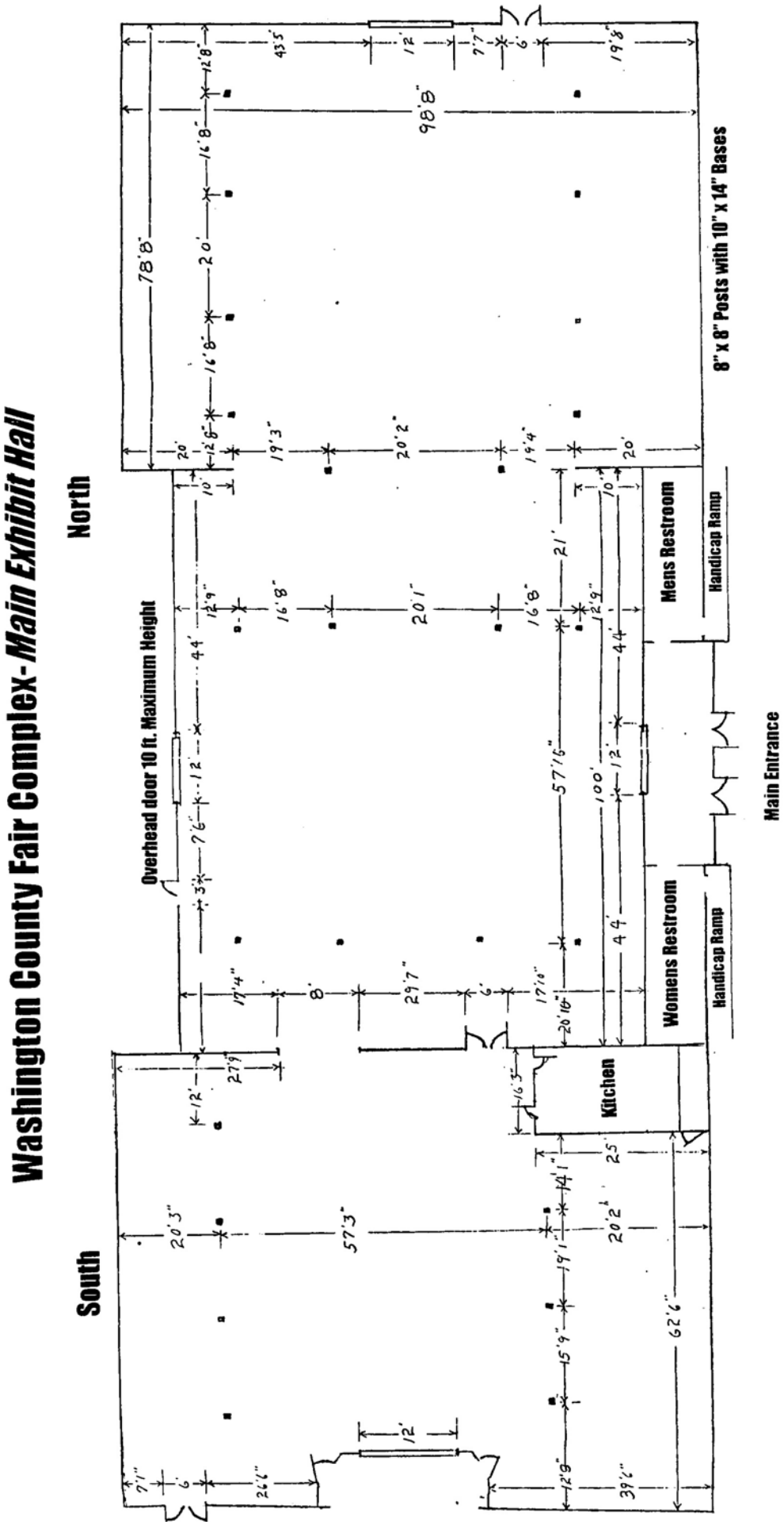
6. Appendix

Appendix

A. Aerial of Fair Complex



B.


Washington County Fair Complex- Main Exhibit Hall
North
South
8" x 8" Posts with 10" x 14" Bases
Overhead door 10 ft. Maximum Height
Mens Restroom
Handicap Ramp
Womens Restroom
Handicap Ramp
Kitchen
Main Entrance

C.

CLOVERLEAF BUILDING

(39' X 78' Room)

Please use this map to indicate your table layout.
REMEMBER: Keep areas shown around exits clear for safe evacuation

1/8 of an inch=1 foot

RETURN THIS NO LATER THAN 2 WEEKS PRIOR TO YOUR EVENT

Name:_____

Date:_____

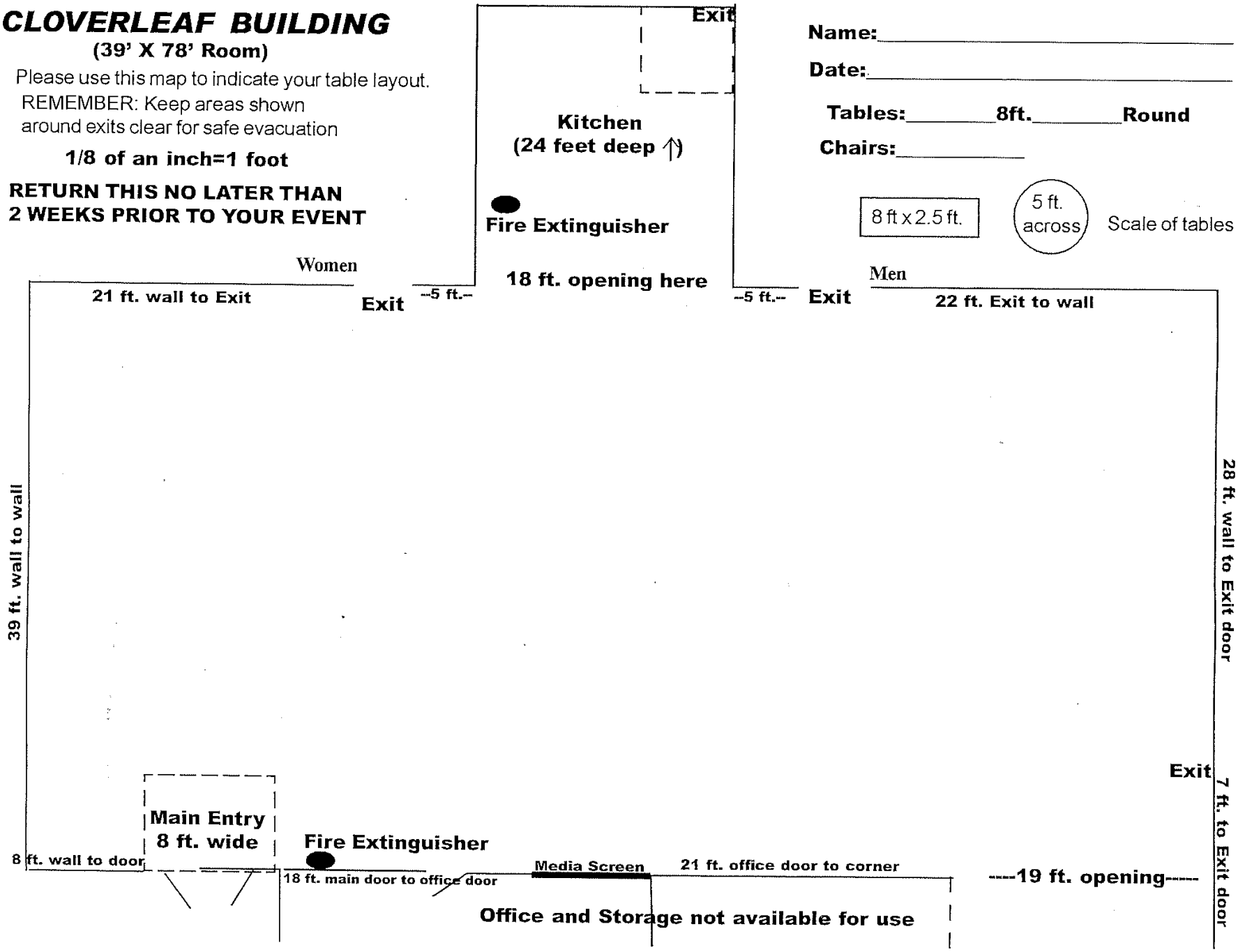
Tables:_____**8ft.**_____**Round**

Chairs:_____

8 ft x 2.5 ft.

5 ft. across

Scale of tables



D. Structural Engineering Report, February 26, 2018

WASHINGTON CO FAIRGROUNDS - MAIN EXHIBIT HALL

I. INTRODUCTION

In 2009, SFA Design Group was retained by Scott-Edwards Architecture to provide a structural condition assessment for the above referenced property. The purpose of this investigation was to determine the condition of this building in comparison to minimum life safety performance levels as prescribed by the currently adopted standards contained within the 2006 IBC.

The Owner (Washington County Fair Complex) has requested an update of the 2009 Facilities Assessment Report to document: current condition, code compliance, potential upgrades with estimate of construction cost, estimate of replacement cost, and assessment of remaining useful life.

Construction drawings were not available at the time of our visit and it is unlikely that original construction documents exist. Therefore, our understanding of the physical characteristics of the building is based on visual observation and conversations with fairgrounds personnel alone.

Observations, conclusions, and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. SFA Design Group, therefore, can in no way warrant or guarantee the condition of the existing construction of the building, nor the site upon which it sits.

II. GENERAL DESCRIPTION

The structure is reported to have been built in 1950, generally rectangular in shape having an approximate 25,000 sf footprint, and one level in height. One major renovation of the structure occurred in 1990 wherein a number of columns supporting the heavy timber roof trusses were removed and the remaining trusses strengthened for the larger spans. Construction and materials used, as we understand it, are as follows:

- The roof is double pitched with 1x skip sheathing spanning over 2x6 rafters (max span of 20ft) spanning to heavy timber trusses running the length of the building which are supported by wood posts (max spacing of 20ft). Several of these support posts have been removed and the installation of a steel angle truss sistered to each side of the remaining heavy timber trusses have been installed. At the support points for these retrofitted trusses, two steel tube columns have been installed at each end of each newly strengthened truss and supported on what appears to be new footings cut into the existing slab. Cable tension ties were also installed at the time of this remodel to apparently combat lateral spreading of the roof framing. These cables are clamped with two C-clamps and are, in our opinion, largely ineffective.
- The entire buildings exterior and interior 8” CMU walls are completely unreinforced with 16” flush wall pilasters at points of roof truss supports.
- Foundations were not observed but are assumed to be present.

III. DISCUSSION

Gravity Systems

The gravity components of the structure, which include the 1x skip sheathing, 2x6 purlins, 2x8 ridge beam, heavy timber trusses, wood columns, steel retrofit trusses, steel columns, unreinforced CMU bearing walls, and foundations, in general appear visually to be in good condition, however, based on experience and currently accepted design standards, we feel that the entire roof system is poorly constructed, sorely undersized and, if subjected to design level loading, likely to collapse. The unreinforced CMU bearing walls are likely adequate for gravity loadings they would be required to resist under current requirements with the exception of the flush wall pilasters. Due to the lack of reinforcement it is possible that sudden failure would occur under maximum loading. Foundations appear to be adequate due to the absence of noticeable settlement.

Lateral (Seismic) Systems

The lateral system of this structure is basically composed of a 1x skip sheathing diaphragm supported by unreinforced CMU shearwalls. Diaphragms of this type poorly transfer lateral loadings to their supporting members. Due to the large amount of solid wall around the perimeter of the building it is expected that the existing unreinforced CMU shearwalls would perform adequately during a design level seismic event for in-plane lateral loadings.

We have major concerns with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading and vertical loading from snow and wind events. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

Factors of Safety (FS)

It may be helpful to understand how building design actually works in order to understand what we mean when we say a building is unsafe. Structural design employs engineering principals to come up with various types of loadings that are applied to the building. The members or systems within the building are then evaluated for their corresponding stress levels. Allowable stress levels are affected by the grade of the material being used, the size and configuration of the section used, and the length of the member being used. Allowable stresses have factors of safety built into them by the various code committees that are in charge of the particular material type in order to avoid collapse due to the reliability of the grading of the material being used. For instance, wood design has a FS of 4 for most wood types. So when we say that a roof member doesn't work under a design level snow event but the roof doesn't collapse, the structure is using the reserve capacity of the member contained within the factor of safety for the design of that members material type. This concept applies to both vertical and lateral systems. That said, while the building appears to be holding up under the loadings experienced over the last several decades, it is using an unacceptable factor of safety for occupancy as determined and described by the currently adopted International Building Code. Some of the roof members have a FS less than 1 when it is required by code to have a minimum FS of 4. The result is the wood structure is significantly overstressed and does not have the FS required to

maintain the minimum safety standard for the building. This represents a severe hazard to occupants.

Mitigation of deficiencies for occupancy

We have identified five different areas of concern with respect to the performance of this building during design level loadings that would affect the occupancy of the building.

1. Inadequate roof diaphragm for transfer of design level seismic loads to resisting lateral lines.
    a. Opt 1: Remove existing roofing and install new roof sheathing on top of roof with proper sub-diaphragms, continuous cross ties, and nailing and re-roof.
    b. Opt 2: Leave existing roofing in place and provide new roof sheathing with proper sub-diaphragms, continuous cross ties, and nailing from the underside of the roof.
2. Inadequate roof framing for design level snow and/or wind loads.
    a. Provide additional framing sistered to existing roof framing for additional strength to resist wind and/or snow loadings.
3. Inadequate attachment of CMU walls to the roof diaphragm.
    a. Install appropriately designed simpson wall ties, generally spaced at approximately 4ft on center with attachment to top of CMU wall and roof diaphragm.
4. Inadequate reinforcement of CMU walls for out of plane seismic loading.
    a. Opt 1: Provide carbon armor fabric on both sides of the CMU walls spaced at approximately 30” oc with appropriate development length and attachment to roof diaphragm.
    b. Opt 2: Provide steel HSS strong backs at 30” oc that span from anchorage to the slab on grade and the roof structure above. Provide clip angles at 18” oc for full height with 5/8” diameter epoxy anchors with simpson SET-XP epoxy and 5” min embed typ.
5. Improper construction for removal of existing columns at select locations.
    a. Replace all columns removed under previous remodel.
6. A portion of the roof wood structural members do not meet the code required factor of safety
    a. Opt 1: Verify capacity and provide additional framing sistered to existing non-conforming roof framing to increase factor of safety above the code required minimum factor of safety
    b. Opt 2: Verify capacity and replace non-conforming wood structural members with new members that are adequately sized to meet the minimum factor of safety

IV. FINAL STATEMENT

Based on our visual investigation, we believe this building represents a severe life safety hazard to the public. Vertical and lateral upgrades, complying with current code requirements, to the building should be implemented prior to its use.

If you need further information please don't hesitate to call.

Sincerely,

SFA Design Group

Jeff Fitch, P.E.
Principal

WASHINGTON CO FAIRGROUNDS – POULTRY, 4-H NORTH AND 4-H SOUTH

I. INTRODUCTION

SFA Design Group was retained by Scott-Edwards Architecture to provide a structural condition assessment for the above referenced property. The purpose of this investigation was to determine the condition of this building in comparison to minimum life safety performance levels as prescribed by the currently adopted standards contained within the 2006 IBC.

The Owner (Washington County Fair Complex) has requested an update of the 2009 Facilities Assessment Report to document: current condition, code compliance, potential upgrades with estimate of construction cost, estimate of replacement cost, and assessment of remaining useful life.

Construction drawings were not available at the time of our visit and it is unlikely that original construction documents exist. Therefore, our understanding of the physical characteristics of the building is based on visual observation and conversations with fairgrounds personnel alone.

Observations, conclusions, and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. SFA Design Group, therefore, can in no way warrant or guarantee the condition of the existing construction of the building, nor the site upon which it sits.

II. GENERAL DESCRIPTION

The construction of this building is consistent with traditional pole barn construction utilizing posts embedded in the ground that support double 2x roof girders which in turn support 2x roof joists to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing.

III. DISCUSSION

The condition of these buildings varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said, should these buildings be classified for use by the public vertical and lateral upgrades to current standards would be required.

Due to large spans, undersized members, poor construction practices, and long term exposure to water which has caused rot to occur in the skip sheathing, roof joists, and columns, we have concerns with the structural integrity of these buildings. In general, we would expect to find that the roof system is over stressed by at least a factor of 2.

Problematic roof structures between 4H Barns North and South, and 4H Barn North and Poultry, have been removed since the 2009 assessment. Some roof members and poles exhibiting dry rot have been replaced, and some non-structural improvements have been made. Strengthening of lateral force system and gravity systems has not been implemented.

IV. FINAL STATEMENT

Based on our visual investigation, we believe these buildings to be in general non-compliance with current code requirements and that vertical and lateral

upgrades, complying with current code requirements, to the building should be implemented prior to their use.

If you need further information please don't hesitate to call.

Sincerely,

SFA Design Group

Jeff Fitch, P.E.
Principal

WASHINGTON CO FAIRGROUNDS – SHOW RING, AUCTION RING, FRIENDSHIP SQUARE

I. INTRODUCTION

SFA Design Group was retained by Scott-Edwards Architecture to provide a structural condition assessment for the above referenced property. The purpose of this investigation was to determine the condition of this building in comparison to minimum life safety performance levels as prescribed by the currently adopted standards contained within the 2006 IBC. Construction drawings were not available at the time of our visit and it is unlikely that original construction documents exist. Therefore, our understanding of the physical characteristics of the building is based on visual observation and conversations with fairgrounds personnel alone.

Observations, conclusions, and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. SFA Design Group, therefore, can in no way warrant or guarantee the condition of the existing construction of the building, nor the site upon which it sits.

II. GENERAL DESCRIPTION

The construction of these buildings is consistent with traditional pole barn construction utilizing posts embedded in the ground that support roof trusses which in turn support 2x purlins to resist vertical and lateral loading. Sheathing, if present, is typically 1x skip sheathing.

III. DISCUSSION

The condition of these buildings varies but is generally good as it relates to the functionality of an agricultural building such as a pole barn. That said, should these buildings be classified for use by the public vertical and lateral upgrades to current standards would be required.

IV. FINAL STATEMENT

Based on our visual investigation, we believe these buildings to be in good condition if classified as an agricultural building but in general non-compliance with current code requirements for a public use classification.

If you need further information please don't hesitate to call.

Sincerely,

SFA Design Group

Jeff Fitch, P.E.
Principal

WASHINGTON CO FAIRGROUNDS – MILKING PARLOR

I. INTRODUCTION

SFA Design Group was retained by Scott-Edwards Architecture to provide a structural condition assessment for the above referenced property. The purpose of this investigation was to determine the condition of this building in comparison to minimum life safety performance levels as prescribed by the currently adopted standards contained within the 2006 IBC. Construction drawings were not available at the time of our visit and it is unlikely that original construction documents exist. Therefore, our understanding of the physical characteristics of the building is based on visual observation and conversations with fairgrounds personnel alone.

Observations, conclusions, and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. SFA Design Group, therefore, can in no way warrant or guarantee the condition of the existing construction of the building, nor the site upon which it sits.

II. GENERAL DESCRIPTION

The building is an un-dated, single level unreinforced masonry structure, rectangular in shape, one level in height, with a double pitched roof and slab on grade floor. Attached to, and extending away from, this building is a double pitched light framed breezeway. Roof construction consists of 2x joists with 2x collar ties spanning to post and beam lines.

III. DISCUSSION

We have major concerns for the URM component with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

The breezeway structure is in a state of failure and should be cordoned off and torn down.

IV. FINAL STATEMENT

Based on our visual investigation, we believe this building represents a severe life safety hazard. This building should be torn down or vertical and lateral upgrades, complying with current code requirements, building should be implemented prior to its use.

If you need further information please don't hesitate to call.

Sincerely,

SFA Design Group

Jeff Fitch, P.E.
Principal

WASHINGTON CO FAIRGROUNDS – RESTROOM BUILDING

I. INTRODUCTION

SFA Design Group was retained by Scott-Edwards Architecture to provide a structural condition assessment for the above referenced property. The purpose of this investigation was to determine the condition of this building in comparison to minimum life safety performance levels as prescribed by the currently adopted standards contained within the 2006 IBC. Construction drawings were not available at the time of our visit and it is unlikely that original construction documents exist. Therefore, our understanding of the physical characteristics of the building is based on visual observation and conversations with fairgrounds personnel alone.

Observations, conclusions, and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. SFA Design Group, therefore, can in no way warrant or guarantee the condition of the existing construction of the building, nor the site upon which it sits.

II. GENERAL DESCRIPTION

The building is an un-dated, single level unreinforced masonry structure, rectangular in shape, one level in height, with a double pitched roof and slab on grade floor.

III. DISCUSSION

The general condition of the building, from a lateral standpoint is very poor.

We have major concerns with respect to collapse, and therefore life safety for this building, due to out of plane seismic loading. Based upon performance of buildings of this type in prior seismic events we would expect to see several major failures. Such failures are; collapse of exterior walls due to a lack of reinforcement and/or proper support at the roof, collapse of headers at exits/doorways, and loss of support of roof members due to these failures.

IV. FINAL STATEMENT

Based on our visual investigation, we believe this building represents a severe life safety hazard to the public. Vertical and lateral upgrades, complying with current code requirements, to the building should be implemented prior to its use.

If you need further information please don't hesitate to call.

Sincerely,

SFA Design Group

Jeff Fitch, P.E.
Principal

INTERFACE ENGINEERING

100 SW Main Street, Suite 1600
Portland, OR 97204
TEL 503.382.2266
FAX 503.382.2262
www.interfaceengineering.com

memo

Project Number		**Date**	November 10, 2017
Project Name	Washington County Fairgrounds due dilligence		
To	Sid Scott	**Phone**	503-226-3617
	Scott/Edwards Architecture		
	2525 E. Burnside Portland, OR 97214		
From	Mark Jackson	**@**	Interface Engineering, Inc.
Distribution	SEA, File		

Applies To **Electrical**

Main Exhibit Hall – Electrical

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

  Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing exterior-mounted electrical service panel to comply with Oregon Electrical Specialty Code (OESC) article 230. This requirement limits the number of electrical services at a building where voltages are identical and aggregate ampacity is less than 2,000 amps.

  Fulfillment of this requirement may necessitate relocation of the exterior service panel to a pole or rack physically separate from the building.

- Revise existing interior conditions which prevent compliance with OESC article 110 as related to clearance requirements in front of electrical panels and equipment.

  Fulfillment of this requirement may necessitate relocation of either objects located within the required clear areas or relocation of electrical panels/equipment. Except for a structural wall, it is typically more cost effective to move the objects located within the required clearance.

- The EPAC Act of 2005 prohibits the manufacture of all old technology relating to T-12 fluorescents, and manufacture of T12 magnetic ballasts was discontinued in 2010. Manufacture of T12 fluorescent lamps have been discontinued in 2012.

  Fulfillment of this requirement may necessitate replacement of all T12 fluorescent lighting with energy efficient LED.

Cloverleaf Community Building – Electrical

- Upgrade existing interior and exterior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

  Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 210. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in non-dwelling unit kitchens and exterior locations.

  Fulfillment of this requirement will necessitate replacement of some receptacles and verification of continuous ground path back to branch panels.

Poultry Barn – Electrical

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

  Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
  - Areas having an equipotential plane
  - Outdoors
  - Damp or wet locations
  - Dirt confinement areas for livestock

  Fulfillment of this requirement will necessitate replacement of most receptacles and verification of continuous ground path back to branch panels.

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

  Fulfillment of this requirement will necessitate installation of a copper equipment grounding conductor in all existing branch circuiting.

4-H South & 4-H North Barns – Electrical

- Upgrade existing interior lighting equipment to provide compliance with Oregon Electrical Specialty Code (OSSC) section 547 (Agricultural Buildings). This section requires that luminaires be constructed so as to minimize the entrance of dust, provide protection from damage via suitable guard, and be water-tight (where exposed to condensation, cleaning water or cleaning solution).

  Fulfillment of this requirement will necessitate replacement of all temporary incandescent open-lamp string lighting and replace with sealed and gasketed LEDfluorescent luminaires and keyless incandescent luminaires..

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

  Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
  - Areas having an equipotential plane
  - Outdoors
  - Damp or wet locations
  - Dirt confinement areas for livestock

  Fulfillment of this requirement will necessitate replacement of most receptacles and verification of continuous ground path back to branch panels.

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

  Fulfillment of this requirement will necessitate installation of a copper equipment grounding conductor in all existing branch circuiting.

<u>Dairy and Dairy Women Barns – Electrical</u>

- Upgrade existing interior lighting equipment to provide compliance with Oregon Electrical Specialty Code (OSSC) section 547 (Agricultural Buildings). This section requires that luminaires be constructed so as to minimize the entrance of dust, provide protection from damage via suitable guard, and be water-tight (where exposed to condensation, cleaning water or cleaning solution).

  Fulfillment of this requirement will necessitate replacement of all open-lamp fluorescent luminaires and keyless incandescent luminaires..

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
    - Areas having an equipotential plane
    - Outdoors
    - Damp or wet locations
    - Dirt confinement areas for livestock

  Fulfillment of this requirement will necessitate replacement of most receptacles and verification of continuous ground path back to branch panels.

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

  Fulfillment of this requirement will necessitate installation of a copper equipment grounding conductor in all existing branch circuiting.

<u>Goat and horse Barns – Electrical</u>

- Upgrade existing interior lighting equipment to provide compliance with Oregon Electrical Specialty Code (OSSC) section 547 (Agricultural Buildings). This section requires that luminaires be constructed so as to minimize the entrance of dust, provide protection from damage via suitable guard, and be water-tight (where exposed to condensation, cleaning water or cleaning solution).

  Fulfillment of this requirement will necessitate replacement of all open-lamp fluorescent luminaires and keyless incandescent luminaires..

- Upgrade existing interior emergency egress lighting equipment to provide compliance with Oregon Structural Specialty Code (OSSC) section 1006. This section requires that "emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 foot-candle (11 lux) and a minimum at any point of 0.1 foot-candle (1 lux) measured along the path of egress at floor level…"

  Fulfillment of this requirement will necessitate the installation of either battery backup unit lighting equipment (bug-eyes) or standard length fluorescent luminaires containing battery backup ballasts. Additional branch circuiting will be required to power the new battery units.

- Revise existing interior and exterior power receptacles to comply with Oregon Electrical Specialty Code (OESC) article 547. Ground-fault circuit interrupter (GFCI) protection is required at all 15 and 20-amp, 125 volt receptacles in the following locations:
    - Areas having an equipotential plane
    - Outdoors
    - Damp or wet locations
    - Dirt confinement areas for livestock

  Fulfillment of this requirement will necessitate replacement of most receptacles and verification of continuous ground path back to branch panels.

- Revise existing branch circuiting equipment grounding conductors to comply with Oregon Electrical Specialty Code (OESC) article 547. A separate copper equipment grounding conductor is required in all circuiting.

  Fulfillment of this requirement will necessitate installation of a copper equipment grounding conductor in all existing branch circuiting.

- Revise existing service-entrance equipment and locations to comply with Oregon Electrical Specialty Code (OESC) articles 230 and 547. A site-isolating device (main disconnecting means/switch) is required where multiple buildings are fed from one distribution point. The site-isolating device is required to be pole-mounted (outside).

  Fulfillment of this requirement will necessitate revisions to some barn electrical panel as well as the installation of a site-isolating device (main disconnecting means/switch). Revisions to the overhead and/or underground interconnecting feeders will also be required.

F.

Heather Hargesheimer

From: Dennis Carney [dennisc@ci.hillsboro.or.us]
Sent: Monday, March 02, 2009 7:46 AM
To: Heather Hargesheimer; Mohamad Tajdar; Joseph Ligatich; Jim Imlah
Cc: Mike Gieszler; Mike Barnes; Ricky Icenogle
Subject: RE: Washington Fair Complex

Heather,
I asked Mike Gieszler (our plans examiner) to come up with a occupancy classification for the current code of an 4-H animal barn at the fairground. He has determined that the occupancy would be an S-1 for the barn's. The animal judging barn's where bleachers (assembly) are would be an A-4 occupancy.
Please see the attached e-mail from Mike.
From what I understood from our tour, there is no change in use in these buildings and they have always been used for this purpose.
Hope this helps in your analysis.
Dennis Carney
Chief Building Inspector
City of Hillsboro
503-681-6440
From: Mike Gieszler
Sent: Thursday, February 26, 2009 4:23 PM
To: Dennis Carney
Cc: Mike Barnes
Subject: Fair complex buildings

Dennis,
In review of the commentary for appendix C, I find that the Fair Complex animal shelters are to be classified as S-1 occupancies. The requirements for a U occupancy are not conducive to the occupant load you may have in the building during the fair. Note that a U occupancy would allow a single exit building of 15,000 sq. ft**.** **Not a safe situation for the public!** The commentary eludes to the fact that U occupancies do not have an occupant load per say. This is not the case for a 4H type of structures used during the fair.

Mike Gieszler
Plans Examiner
City of Hillsboro Building Department
150 E Main St. Fourth Floor
Hillsboro, Or 97123-4028
p(503)681-6106
f(503)681-6469
e:mikeg@ci.hillsboro.or.us

From: Heather Hargesheimer [mailto:heather@seallp.com]
Sent: Wednesday, February 25, 2009 1:10 PM
To: Dennis Carney; Mohamad Tajdar; Joseph Ligatich; Jim Imlah
Subject: Washington Fair Complex

Dennis, Jim, Joseph and Mohamad,
Thank you for your time and input yesterday. It was very helpful to understand your concerns with the existing facilities at the Fair Complex. We are compiling all the information and presenting the findings to the board next week.

heather l hargesheimer aia, LEED AP
scott|edwards architecture, llp
2525 e. burnside st.portland, or 97214
503.226.3617 *phone* 503.226.3715 *fax*
www.seallp.com

G.

July 17, 2008

Ms. Leah Perkins
Fair Director
Washington County Fair Complex
873 NE 34th Ave.
Hillsboro, Oregon 97124

RE: ROOF EVALUATIONS – MAIN EXHIBIT HALL BLDG. & CLOVERLEAF BLDG.

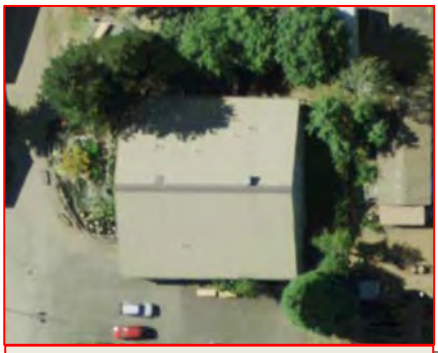
Dear Ms. Perkins:

As requested, on June 22, 2008, Professional Roof Consultants, Inc., (PRC) visited the Washington County Fair Complex in Hillsboro, Oregon in order to perform an inspection of the metal roofs and associated components currently in service at both the Main Exhibit Hall and Cloverleaf Buildings. The purpose for the inspection was to evaluate the existing roof systems and related components to determine their current condition and estimated remaining service lives, locate potential problem areas pertaining to the existing roofing and flashing systems, identify code issues, attempt to ascertain the causes of on-going leaks at both buildings, and provide recommendations for future actions with regards to either repair or replacement.

BUILDING SUMMARIES

The Main Exhibit Hall is a 24,000 SF open floor plan building that serves as kitchen and exhibit space. Constructed by volunteer labor in the 1950s, it has been plagued with a series of problems, most notably several on-going roof leaks (predominantly at the south end of the building) and various structural issues. Building walls are allegedly constructed of unreinforced concrete masonry units. Open web wood trusses support the ceiling structure, and also support the roof; cable collar ties have been recently installed at the trusses in an effort to upgrade the structural soundness of the walls. The current roof system on the Exhibit Hall is a precoated galvanized steel standing seam panel roof installed over a single layer of asphalt shingles (the former roof system) on part of the roof, with the remaining installed over an asphalt-impregnated base sheet (it appears as though shingles were removed from part of the roof – not all). Roof sheathing, depending upon the location (one side of the ridge or the other), is either 5 ply plywood sheets or shiplap planks mechanically attached to 2"x6" wood purlins. Where "attic" space exists, insulation is installed below the ceiling, and is present neither above the roof deck nor in the "attic" space, aside from walls. Where no "attic" space is present, batt insulation blankets faced with a vapor retarding vinyl sheet are mechanically attached between rafters.

Aerial View – Main Exhibit Hall



Aerial View – Cloverleaf Bldg.

According to Fair Complex personnel, construction of the approximately 6,000 SF Cloverleaf Building began in 1969 and

was completed in 1982). A steel framed building, both EIFS (Exterior Insulated Finish System) and stucco have been used as exterior finishes. The currently installed 14-year old roof is a structural ribbed standing seam, 36" wide metal panel system over metal framing; fiberglass batt insulation and associated vapor retarder are installed below the roof deck between steel purlins. Leaks associated with both the roof and walls have been reported, and water damage was noted at various locations at the time of inspection. The Cloverleaf Building contains exhibit, office and kitchen space.

MAIN EXHIBIT HALL

AN ESTIMATED LIFESPAN FOR THIS ROOF CANNOT BE GIVEN WITHOUT STRUCTURAL EVALUATION
REPAIR AS NEEDED & MAINTAIN UNTIL STRUCTURAL ISSUES ARE ADDRESSED.

1. Precoated 18" wide galvanized steel standing seam roof panels (panel manufacturer unknown) are fastened at the ridge, and are generally in good condition. Fasteners, however, are corroded throughout the area of the roof.
2. The metal panel roof system was reported to be installed over an existing asphalt shingle roof system, though views from underneath the deck show remaining shingles on one side of the ridge only. No separation layer (roofing felt or other synthetic underlayment to keep the asphalt shingles from abrading or sticking to the underside of the metal roof) was noted to be installed between the old and new systems. Roof sheathing (both plywood and shiplap) appeared, generally, in good condition.
3. Vapor retarder attached below the roof deck between rafters has detached at several locations, revealing moldy, water-stained insulation indicating moisture infiltration through the roof system. Water staining at several interior roof to wall locations also exist, indicating roof leaks.
4. Water staining and peeling paint were evident at areas of known leaks (kitchen, men's room, south end at interior wall). Efforts to repair suspected leak causes have been unsuccessful.
5. Concrete masonry unit (CMU) walls exhibit cracks on both the inside and outside of the building. According to Fair Complex personnel, these masonry walls are unreinforced, causing concern about their stability during seismic activities (previous seismic activity caused several of the cracks currently visible).
6. Several of the 2"x6" (nominal) roof joists have been augmented by "sistering" (splicing) with an additional joist, some of which are twisting and cracking. Joists span, unsupported, distances well over the recommended 8'-10' range, causing framing deflection. This deflection produces the wavy and uneven appearance of the metal panels when viewed from roof level.
7. Joists are mechanically attached to the ridge beam with nails, though some were noted to be attached via hanger. Building movement has caused nails at several joist locations to start detaching from the ridge beam.
8. Roof support posts originally installed to floor level were removed during previous building repairs, leaving unrepaired holes in the roof sheathing, and areas of unsupported metal panels. New support posts installed under the ridge beam and extending to the attic floor are of random lengths; several have been augmented with equally random, unfastened pieces of wood tightly stacked between the post and ridge, or post and floor. Building movement has caused several posts to stand less than vertical.
9. Several rooftop pipe penetration flashings have been installed over metal panel seams (a high movement area); preformed flashing boots are adhered to the metal with sealant, rendering the penetration's weather-tightness dependent upon the sealant's integrity (no mechanical fasteners connecting the boot to the panel were noted). Sealant-dependent details are typically high maintenance and prone to early failure if not frequently monitored, especially on roof systems which experience significant thermal expansion and contraction (causing accelerated weakening of the sealant-to-substrate bond over time).
10. Preformed flashing boots installed at vent pipe penetrations lack clamping bands and sealant at top edge, creating a condition through which moisture may be allowed to enter the roof system.
11. Fasteners at the ridge cap flashing (south ridge) have become detached in various locations, creating openings through which wind-blown moisture may enter into the building.

12. Flanged roof vents have been surface-mounted and adhered with sealant to the metal panel (no mechanical fasteners noted), creating a highly sealant-dependant detail. Flashings exhibit corrosion due to galvanic reaction between dissimilar metals.
13. Rake flashing on the northeast and southeast perimeter of the building has detached, exposing the wood substrate below. Additionally, a length of gutter edge flashing near the detached southeast rake flashing has not been installed.
14. A section of rake and fascia flashing is cut away to accommodate the installation of a wall-mounted spotlight, leaving the substrate below exposed to the weather and open to moisture infiltration.
15. Leaks to the interior of the building occur at two valley termination locations (east and west perimeter), both of which lack adequate slope to the gutter and are sealant-dependant.
16. Leaks at gutter seams and downspouts have caused staining of adjacent metal components and rotting of adjacent wood components. Lengths of gutter are misshapen from mechanical damage.
17. Sealant at entrance canopy cricket is brittle and failing. Water staining and debris exist behind cricket.

RECOMMENDATION

1. Based upon observations of roof framing and wall construction at the time of the roof evaluation, a structural evaluation of the building is strongly recommended.

The metal panel roof system is generally in fair condition, with inadequacies related primarily to poor detailing and installation techniques. However, larger, more serious problems exist relative to the building structure; before remedial actions can be recommended for the roof system, PRC strongly suggests a structural evaluation of the building be performed as it is anticipated that structural upgrades which may affect the roof will be required.

PHOTOGRAPHIC DOCUMENTATION

MAIN EXHIBIT HALL

1.01

Cracks in the unreinforced concrete masunry unit wall exist at both interior and exterior of the building.

1.02

Cable collar ties installed to truss system in an effort to stabilize wall movement.

1.03

"Sistering" at roof joists. Note cracking and twisting in repair joist.

1.04

2" x 6" joists are spaced every 24" and span well over the recommended 8'-10' length, causing significant deflection.

1.05

Joists toenailed into the ridge beam are detaching due to building movement.

1.06

Note random wood pieces stacked below roof support posts.

1.07

Detaching vapor retarder reveals moldy and water stained insulation at roof to wall junction.

1.08

Unrepaired hole in plywood sheathing where roof support post previously existed. Note presence of asphalt shingles.

1.09

Wavy appearance in roof panels suggest joist deflection.

1.10

Vent pipe penetration and pipe boot flashing installed over panel seam. Flashing boot is adhered with sealant and lacks clamping and sealant at top edge.

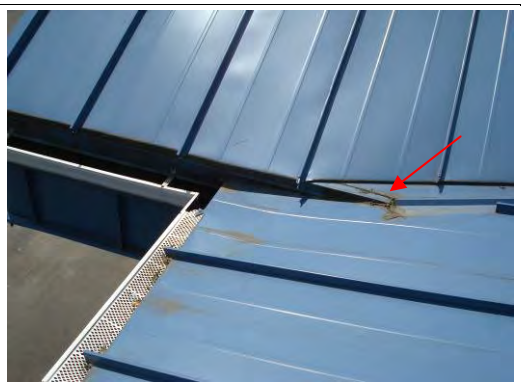
1.11

Flanged vent penetration adhered to panel surface with sealant. Note corrosion from galvanic reaction.

1.12

Raised ridge flashing due to detaching fasteners – south ridge juncture.

1.13

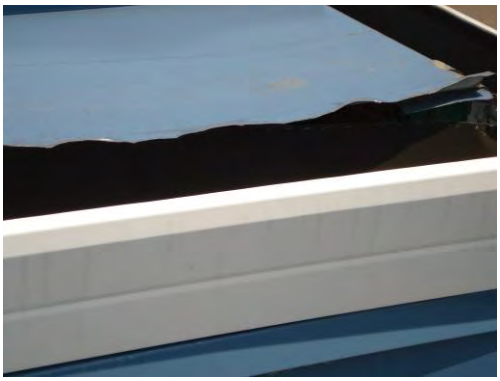


"Dead" valley, adjacent to leak location at men's room. Note staining on panels where water pools, as well as sealant application on downslope.

1.14

Open rake flashing where spotlight has been installed, exposing substrate to weather.

1.15



Missing flashing at gutter section.

1.16

Broken, detached gutter strap.

1.17

Leak at gutter seam – note stained, deformed metal and rotten wood adjacent.

1.18

Sealant dependant cricket-to-roof connection at entrance roof.

CLOVERLEAF BUILDING:

THE LIFE SPAN IS ESTIMATED TO BE BETWEEN 2-3 YEARS WITH REGULAR MONITORING AND MAINTENANCE.
REPAIR AS NEEDED AND MAINTAIN UNTIL FUNDS ARE AVAILABLE FOR REPLACEMENT.

18. The structural metal panel roof system is mechanically attached to steel framing. Fiberglass batt blanket insulation is installed between steel framing members below the roof, in the attic space, and is faced with a polyethylene vapor retarder. Interior wallboard and steel framing members are severely water stained or corroded, especially on the south wall of the building, indicating the historical nature of moisture infiltration to the interior. Corresponding exterior wall damage is evident as well.
19. 36" wide x 21' long ribbed metal panels are mechanically fastened with exposed rubber washered screws. Fasteners, which are numerous, occur at panel side laps, at gutter edges, and at the ridge, provided multiple lines of fixity and effectively inhibiting proper thermal movement (expansion and contraction) of panels. Water staining exists at many fastener locations, and several fasteners have been sealed in what appears to be an attempted leak repair (corroded fasteners were observed from below the roof). Several fasteners at panel seam overlaps have detached from the seam below.
20. Gutters exist at north and south perimeters of the building and have been attached by straps mechanically fastened through the roof every 6' o.c. Gutters lack expansion joints, and riveted gutter seams are leaking.
21. Multiple pipe and vent penetrations exist on the south side of the building; associated flanges and flashings are surface mounted and sealant dependant. Excessive corrosion is evident on all penetrations and associated components.
22. Ridge flashing is constructed from varying lengths of metal, is lapped and sealant dependant. Failing sealant and bowing metal create voids through which moisture can enter the roof system.
23. Wall finish systems (both EIFS and stucco) are installed to the bottom of the gutter and to the top of the finished grade, allowing moisture to enter the wall via both leaking gutter seams at the top of the wall and wicking action from the soil at the bottom of the wall. Though the north-facing overhang wall and soffit exhibit the worst damage (soffit is detaching from the vertical wall), instances of damage from moisture infiltration into the wall system exist at various locations throughout.
24. Condensation is present at office windows located on the south side of the building next to a planter bed with sprinkler system. Sill flashings have not been installed, and the exterior wall finish coat is installed to grade, creating two likely causes for moisture within the wall system at this location.
25. A hole in the cementitious/hybrid stucco wall exists on the east wall of the building, adjacent to exterior attic access door.

RECOMMENDATION

1. ***As soon as financially feasible, remove the existing metal panel roof system and associated components and replace with a new roof system, ensuring proper fastening patterns and flashing details are followed. Two options could be considered for the roof replacement:***
    a. ***Complete removal of the existing system and installation of a concealed fastener, structural standing seam metal panel roof system.***
    b. ***Overlay the existing roof (pending structural evaluation) with rigid insulation and new adhered single ply membrane system.***
2. ***Extend gutter edge of roof and install new wood blocking as required to allow for new gutter and metal closure/drip flashing to be installed away from the wall finish system.***
3. ***Remove and replace failing gutter and downspout system. Provide expansion joints in gutter lengths which exceed 50'.***
4. ***Remove damaged batt insulation and install new. Scrape, prime and paint all corroded metal framing members.***
5. ***Remove and reinstall damaged wall components, with priority given to components associated with the north wall.***

6. ***Where possible (i.e., where walls do not require extensive structural repair), patch holes and cracks in the exterior wall finish systems.***
7. ***Redirect sprinkler spray away from building walls and windows.***
8. ***Remove and replace failing sealant applications at windows. Consider installing sill/pan flashing at window.***

The structural metal panel roof system installed on the Cloverleaf Building is currently failing, primarily due to poor detailing and installation, as well as the high maintenance nature of as exposed fastener metal panel roof system. Multiple and leaking fasteners coupled with failing sealant at sealant dependant installations (penetrations, ridge cap) appear to consistently allow water through the panel system into the building's interior, causing significant damage at building walls.

PHOTOGRAPHIC DOCUMENTATION

CLOVERLEAF BUILDING

1.19

Multiple fasteners exist throughout the roof system, inhibiting the panels' ability to expand and contract.

1.20

Most likely an attempt to stop water from penetrating fastener holes, sealant has been applied over fastener heads at various locations.

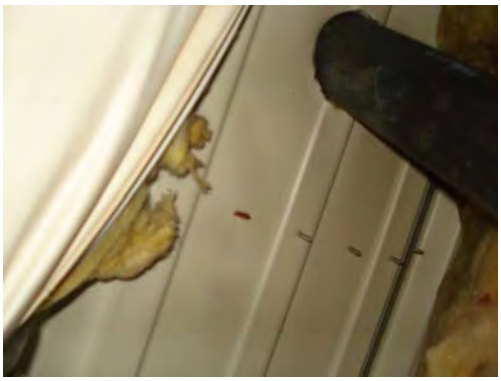
1.21

Water staining around sealed fastener head.

1.22

Sealant-dependant pipe flashing and corroded pipe penetration.

1.23



Corroded fasteners as seen from below the roof panel

1.24

Water stained batt insulation at vent pipe penetration.

1.25

Gutter straps fastened through the roof panel. Note also excessive organic debris within gutter.

1.26

Wall finish installed flush with bottom of gutter. Note leaking gutter seam at this location.

1.27

Stained and damaged wall sheathing as seen from attic space – south wall.

1.28

South wall – note water staining on wall and floor as well as corroded steel framing.

1.29

Exterior view of south wall overhang and soffit. Note soffit panel is warped and detaching from vertical wall.

1.30

Close-up view of detaching soffit panel at south wall overhang.

1.31

Hole through wall system at east side of building. This cavity currently serves as a bird house.

1.32

Note rusted door framing members at attic access location – east wall.

1.33

Patch/repair holes and cracks in finish system where possible.

1.34

Damage to wall system at front entrance.

1.35		**1.36**	
	Lapped, sealant-dependant ridge flashing. Sealant was noted to be failing at this location.		Algae growth at lower edge of corridor overhang, indicating water exists or has existed within the wall system.

Thank you for the opportunity to provide services with regard to this project. Please feel free to contact us if you have any questions or concerns regarding this letter report, or if we may be of further assistance.

Sincerely,

Meg Ridgely

Meg Ridgely, Technical Specialist, RRO
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H.

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November 17, 2008

Washington County Fair Complex
Leah Perkins-Hagele, Fair Coordinator
873 NE 34th Avenue
Hillsboro, OR 97124

Re: Structural Building Observation – Main Exhibit Hall
Washington County Fair Complex
Project Number: 8338

Dear Leah:

This letter summarizes our findings based on our limited visual structural observation, limited review of available plans, and limited structural analysis of the roof structure for the existing Main Exhibit Hall located at the Washington County Fair Complex at 873 NE 34th Avenue, Hillsboro, Oregon. Select photographs from our site visit performed on Friday, October 3, 2008 are enclosed.

The project consists of an approximately 25,500 square foot footprint unreinforced concrete masonry unit (CMU) one-story building with concrete slab on grade floor construction. The original construction date of the building is reported to be approximately 1950. A major remodel was performed in 1990, which included removing a number of the interior roof columns by installing new steel frame roof trusses to reinforce the existing timber framed trusses. It also appears that the main entry was remodeled and expanded at some time in the past though we have no record of that work. Drawings for the original construction were also not available. Drawings for the 1990 reinforcement of the roof structure for removal of the interior columns were provided for our review.

Roof Structure:

The roof structure is identified as 1x tongue and groove straight sheathing supported by 2 x 6 rafters at 2' on center spanning between timber framed trusses spaced from 16'-8" on center to 20'-0" on center. The timber trusses were originally supported at 20' on center by 6 x 6 timber columns. In 1990, two adjacent columns at each truss span were removed creating a 60' long truss, which was reinforced with steel angle framing to create a new steel truss (Fig. 5). Based

on our review of the drawings, the steel framing on site does not appear to conform with the design drawings in that the steel trusses appear to lack diagonal web members between the removed columns as detailed in the drawings. We contacted the original design engineer, Miles Abel and he stated that he was not aware of any revisions and was not involved with the project during construction. During our site visit we observed numerous field repairs of the roof structure in the center building inside the main entry. The repairs appear to be an attempt to shore up the ridge area of the roof through the addition of tension cables, additional ridge support members, and a series of cross beams and posts, see Figures 1, 2, 3, 4, and 5. None of these repairs appears to be engineered and Mr. Abel did not recall being involved with them.

Based on our preliminary analysis, the existing 2 x 6 roof rafters, with spans up to 20' would be overstressed by a factor of approximately three based on current code 25 psf snow load in addition to the building self-weight or dead load. The existing 2 x 8 roof ridge member would be overstressed by a factor of approximately eight. We did not perform an analysis on the remaining timber roof trusses; however, it is likely that they do not meet current code snow load requirements. We also performed a preliminary analysis on the steel reinforcement trusses as shown on the original design drawings and these trusses appeared to have been designed for the current code 25-psf snow load. We did not perform an analysis of the reinforcement trusses as constructed in the field and further field measurements are required.

Walls and Foundation:

The exterior walls are unreinforced CMU block, and the roof trusses bear on unreinforced CMU block pilasters built integrally with the wall. While on site, the building foundation was exposed at one location at the rear of the building. The top of the footing was determined to be approximately 12" below the ground surface and extends approximately 6" from the face of the building. The footing thickness is approximately 8" to 12" thick and of concrete construction. Numerous diagonal and vertical cracks through the CMU walls were observed around the perimeter of the building. These cracks are likely associated with a combination of foundation settlement and shrinkage in the masonry construction due to a lack of vertical control joints in the original construction, along with the lack of horizontal and vertical reinforcing in the walls, see Figures 7, 8, and 9.

Building Codes:

Building codes are intended to provide minimum standards for new construction. Building code standards are intended to minimize potential loss of life and increase safety by reducing the chance of building collapse and protecting routes of exit. The codes do not necessarily address the protection of buildings from structural damage. Building codes are evolutionary in nature with new additions of the code incorporating new knowledge regarding the behavior of structures under a variety of loading conditions, including earthquakes. We did not perform a seismic analysis of this building, but based on our experience with many buildings of this period

we are very familiar with the building type. Current code requirements are much more restrictive than those in the 1950s under which this building was designed. Typically, buildings of this era were designed for wind forces only with seismic design requirements being adopted statewide in the building codes after the date of construction of this building. Newer seismic design standards require substantial extra detailing and strength in the structural members. The primary areas of concern for this structure are the fact that there is no steel reinforcing in the CMU walls, the roof framing is overstressed, the roof diaphragm would be overstressed for in-plane shear, and the anchorage between the roof and exterior walls is very light by today's code requirements.

Based on our site observations and preliminary analysis, we have the following major concerns:

1. The roof structure has a snow load capacity of approximately 2 to 10 psf based on the span of the 2 x 6 rafters varying between 16'-8" and 20'-0". The 2 x 8 ridge has no snow load capacity and is overstressed due to the roof self weight alone, which may be part of the reason for the field repairs. The current code minimum roof snow load requirement is 25 psf.

2. The repairs that have been made to the roof framing appear inadequate and it is our opinion that the roof structure in the central building has a significant risk of collapse. We recommend that further investigation of the as constructed roof structure be accomplished and that construction drawings be developed to properly reinforce the roof structure. We anticipate that this would require installation of a new ridge beam, reinforcement of the cross trusses supporting the ridge, and reinforcement of the existing steel trusses along with the existing timber trusses beyond the newer steel trusses.

3. Due to the use of unreinforced CMU in the construction of the bearing walls, this building could be expected to perform poorly in a code level seismic event with partial or complete collapse possible. Upgrading the building for seismic performance would involve reinforcing the CMU walls, possibly by the addition of steel studs or tube steel strong-backs on the interior face, reinforcing the anchorage of the walls at roof diaphragm, and upgrading the roof diaphragm by the addition of plywood sheathing and reinforcing the connection between the roof diaphragm and the supporting walls.

<u>The Following are Considered Minor Concerns:</u>

1. The cracks in the exterior walls are considered a minor concern due to the large amount of solid wall around the buildings. The cracks do not represent a significant reduction in the wall's ability to resist vertical or lateral loads and we recommend re-pointing the affected mortar joints.

2. The CMU lintels at the larger openings are all cracked at their ends and we recommend that they be reinforced through the addition of new steel headers installed at the interior face of the wall.

3. We observed one broken roof rafter in the North attic space (Fig. 6) and we recommend reinforcing it by installing a new rafter on the side of the existing along with a new Simpson LUS26-2 hanger at the ridge.

Disclaimer:

The purpose of this report and our inspection has been to assist you, our client, in making certain decisions regarding use of the building above described. Our discussion has been based on limited field inspection and experience and judgment of our office staff. No material inspection or material testing, soils investigation, asbestos investigation, hazardous waste investigation, mold investigation, or other work for hidden conditions was accomplished. Due to limitations caused by visual inaccessibility to every structural detail or member, our office cannot assume responsibility for the original structure's theoretical ability to meet current code or the code applicable at the time of construction.

If you have any questions or require additional information, please do not hesitate to call.

Regards,

Ralph Turnbaugh, P.E.
Principal

RT/mdg

Enclosures

REGISTERED PROFESSIONAL ENGINEER
16720
OREGON
July 20, 1993
RALPH TURNBAUGH
EXPIRES: 6/30/10